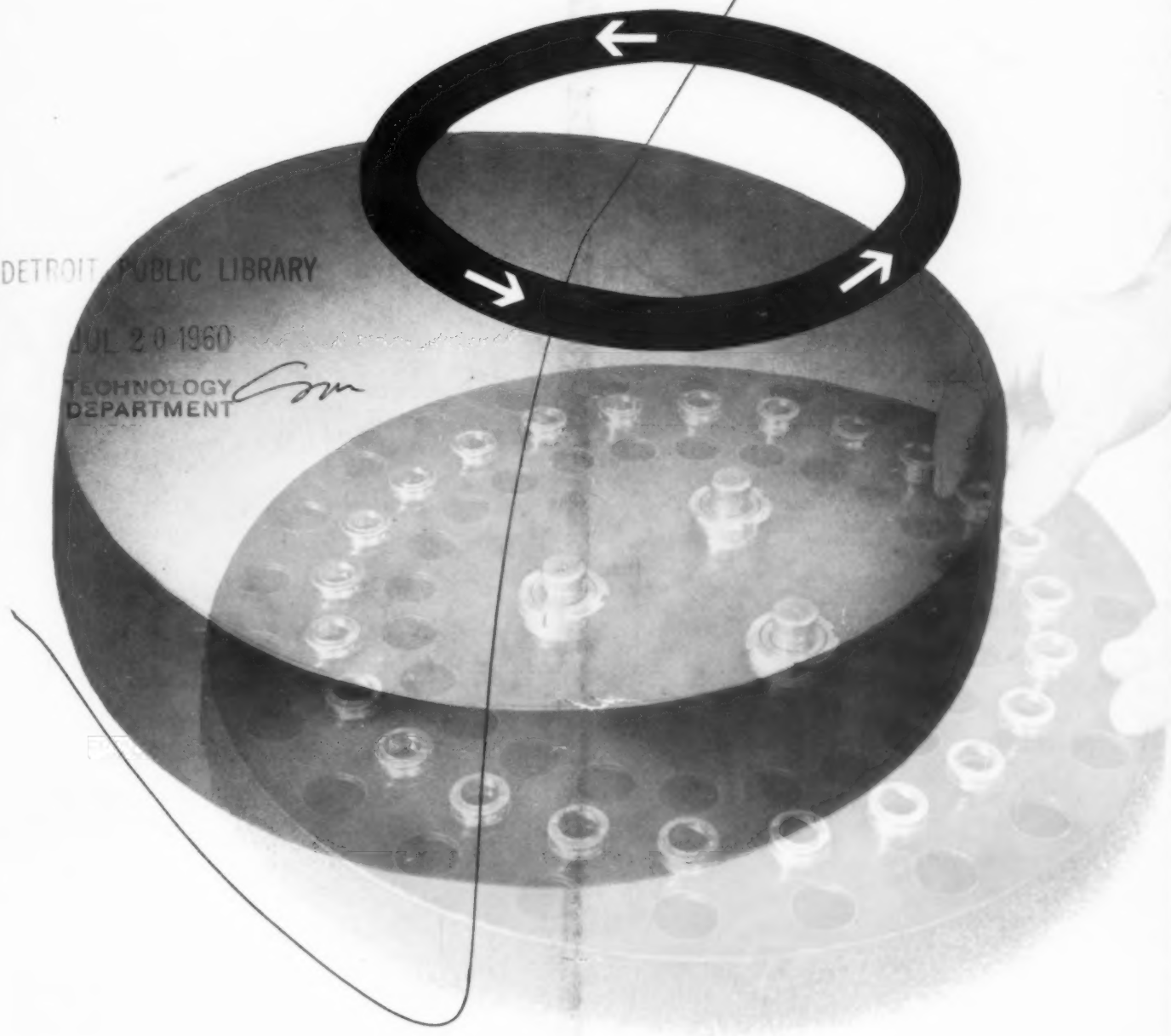
GRINDING and FINISHING

A HITCHCOCK PUBLICATION

JULY · 1960



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TECHNOLOGY DEPARTMENT

Proper Techniques Broaden Lapping Advantages

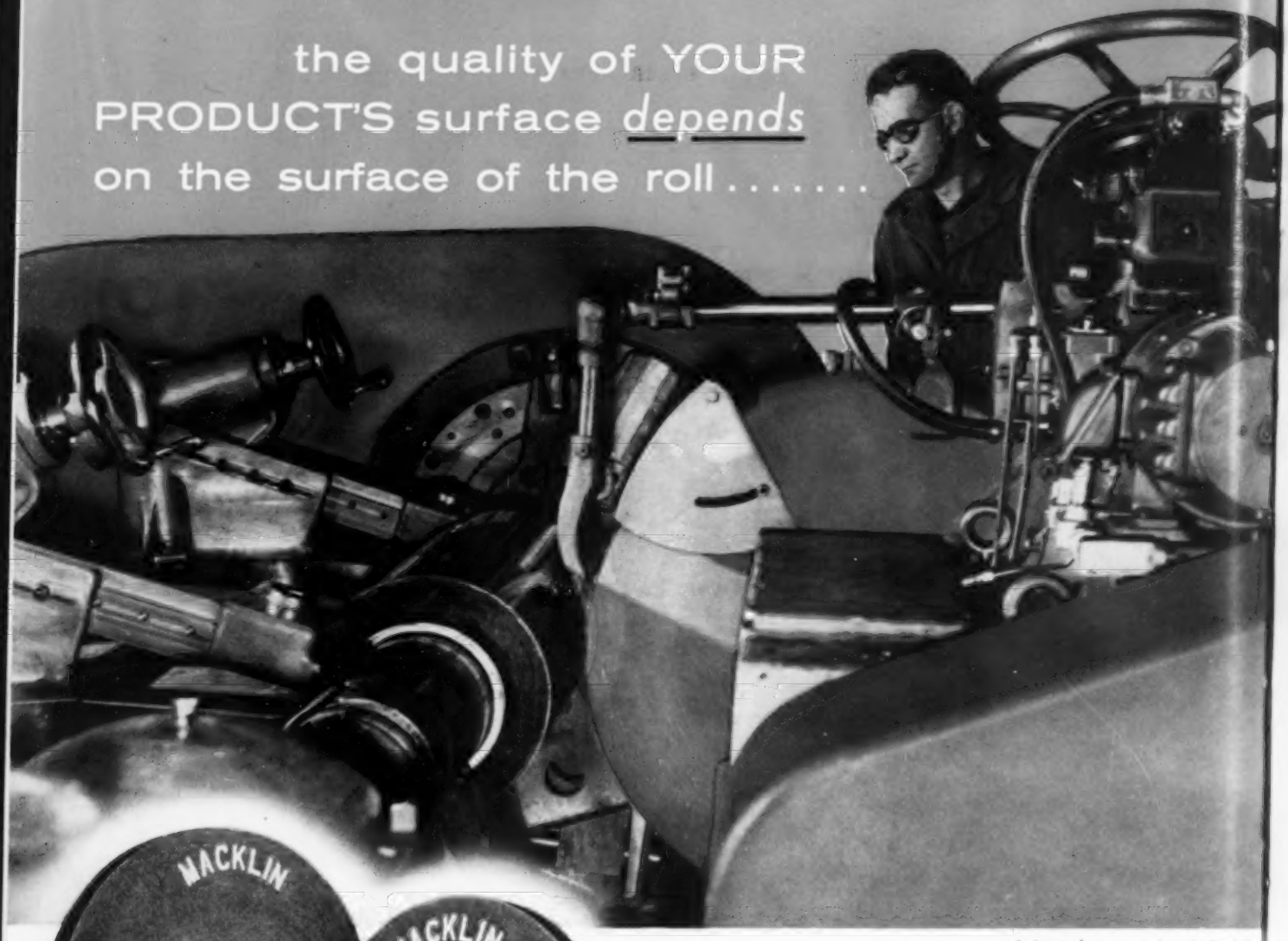
ALSO IN THIS ISSUE:

Secrets of Carbide Die Finishing

Eighty Percent Less Time by Form Grinding Large Rolls

Automatic Sizing and Finishing of Rubber Rolls

the quality of YOUR PRODUCT'S surface *depends* on the surface of the roll.....



photograph courtesy Landis Tool Co.

you can *depend* on MACKLIN.....

....."*Wheels of Profit*"

For practical answers to your roll grinding problems depend on custom-engineered Macklin roll grinding wheels. Their controlled porosity and sharp grains give you top production and a surface free of traverse lines and scratches. They cut fast. Provide good finish without chatter . . . and are available in a complete range of grades and sizes.

You'll find it pays to consult your Macklin abrasive engineer. Regardless of the grinding problem, when you make him a part of your product team you can expect results like the performance records at the left.

HERE'S PROOF OF PERFORMANCE . . .

HOT MILL WORK ROLLS
(Chilled Iron)

Roll size—25½" x 66" long

Comment—"Since this is a new plant and operators are limited in experience, this wheel has increased their production and produced a good finish of 15 to 20 Micro Inch. All operators are pleased with this wheel. It grinds 100 rolls in 95 hours."

36" x 4" x 20"—GC361 J15 B1268

COLD MILL TEMPER MILL ROLLS
(Forged Steel)

Roll Size—20½" x 48" long.

Comment—"Macklin wheel ground 265 rolls and removed 2.109" of stock. Competitive wheel ground 156 rolls and removed 1.297" of stock. The Macklin wheel gave 62% more production than previous wheel used."

30" x 5½" x 12"—A70 L11 B2

Get the complete story. Write for Roll Grinding Bulletin RG60 today.

GRINDING WHEELS

MACKLIN company Dept. 63, Jackson, Michigan

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WHEREVER ABRASIVE OPERATIONS ARE PERFORMED

GRINDING and FINISHING

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July Cover: A close-up of the spider of a lapping machine is the focus of the design, with the upper and lower plates of the machine outlined above and below.

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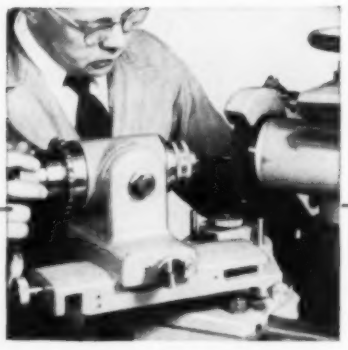
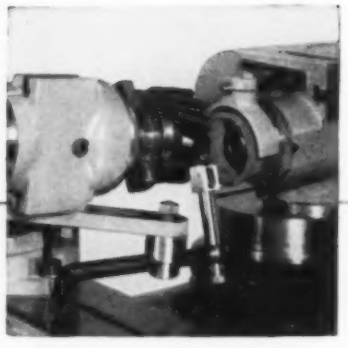
You can accurately grind just a

CINCINNATI Nos. 1

Helical cutters are accurately ground in the twinkling of an eye on this CINCINNATI No. 2 Cutter and Tool Grinder. Note the operator's rear left-hand working position, a Cincinnati convenience for grinding many types of cutters.



Ball nose cutter is ground with the aid of a Radius Grinding Attachment mounted on a CINCINNATI No. 1.



Shell end mill cutters are ground in position on their arbors. This cutter is being ground on a No. 2 CINCINNATI.

Taper
all, a
grind
is on

MMT-PE
MODERN MACHINE TOOLS
PRODUCTION EFFICIENCY

Booth No. 1034

BUILDERS OF FINE MACHINE TOOLS: KNEE TYPE AND BED TYPE MILLING MACHINES • DIE SINKING MACHINES ER AND

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

about every cutter in the shop with

and 2 Cutter and Tool Grinders

CINCINNATI Nos. 1 and 2 Cutter and Tool Grinders give you the opportunity to attain two desirable objectives in your cutter maintenance program: 1) quickly and accurately restore your cutters to top cutting trim; 2) grind cutters of any size and type, ranging from small end mills no bigger than a pencil to heavy 18" diameter face mills.

Check these advantages of CINCINNATIS against any other equipment within their range:

- Ball bearing anti-friction table slide
- Eccentric wheelhead swivel
- Duplicate four-position operating controls
- Large graduated clearance setting dials
- Accurate "Tange-Bar" taper setting device
- Dozens of attachments and accessories

There are many other reasons why CINCINNATI Cutter and Tool Grinders provide an exceptionally strong secondary line of production equipment for machine tools of all types. May we send you complete information on Cincinnati's versatile Nos. 1 and 2 Cutter and Tool Grinders? Write today for catalogs No. M-1852-3 and No. M-2004.

Brief specifications

Size	No. 1	No. 2
Swing over table	8"	10"
Length of work, between tailstock centers	15"	27"
Range: longitudinal	10"	16"
cross	4½"	8"
Catalog No.	M-1852-3	M-2004

Taper reamers, most demanding of all, are given the highest quality grind on a CINCINNATI. The setup is on a No. 2.

Heavyweight 18" diameter face mills are easily ground on a CINCINNATI No. 2 with the aid of a face mill attachment.

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ER AND TOOL GRINDERS • ELECTRICAL DISCHARGE MACHINES

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MILLING MACHINE DIVISION

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Make the correct decision on the choice of your Diamond grinding wheels:
Clear interpretation of the signals shown when on-the-job results are analyzed and translated into proper Diamond Grinding wheel **specifications** will result in the lowest cost in your Diamond wheel usage.

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THE PERFORMANCE BOND

This wheel is a precise duplication of your specification, warranteed when properly operated, to give you the lowest cost per cut of any wheel.

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US UNITED STATES DIAMOND WHEEL CO.

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Editor's Mail

High Powered Surface Grinding Replaces Milling

We have received a number of comments on this article. In addition to the expressions of appreciation, there were requests for information not included in the article. Because the information desired is basic to our industry, we would like to preface the printing of this data with the explanation that all the material was not available to the editorial staff at the time of printing..

Now, in answer to the requests, the chuck used was an Abrasive Associates AA1.4-22" segmental quick-change type and the abrasive segments were supplied by American Emery Wheel Works in a half grade of hardness which was required to provide the performance reported. Both of these products contributed to the success of the operation.

Why Honing? Part IV

Concerning your article "Why Honing—Part IV", the chart on page 46 of the May issue of GRINDING and FINISHING appears to be incomplete. Has not the + or — sign been accidentally omitted in the heading "Coolant Viscosity"? I would assume that a minus sign "means more viscous mixture" and is required if the problem encountered is "Glazing (+), Loading (+), Rough Finish (—), etc.

I have been following your articles with extreme interest and have asked our librarian to order additional copies for our technical service personnel.

Claude G. Wall
E. F. Houghton & Co.

Thank you for calling this to our attention! The minus sign should precede the remark—"means more viscous mixture". The sign was left out inadvertently and we hope that the publishing of your letter will help correct the error.

I have been following your series with a great deal of interest. You did a good job, unbiased and basic. Congratulations.

M. P. Ellis
Planning Coordinator
Micromatic Hone Corporation

Thank you.

A Reader Comments . . .

Your reply to an inquiry from J. K., Bristol, New Hampshire, on page 13 of the May issue of GRINDING and FINISHING has been brought to my attention. (Ceramic Wear Plates?)

I think it only fair to call your attention to the ultra hard alumina AlSiMag® 614. This material is so hard that we are forced to use metal bonded diamond wheels for any finish work at all. . . .

J. L. Rifkin
General Sales Manager
Steatite Division
American Lava Corporation

Alumina for Missile Nose Cone

Guided missile nose cones today constitute a dramatic new market for ceramics made of alumina, the white oxide from which grinding wheels are made.

Aluminum Company of America, the world's largest producer of chemical grade aluminas, is supplying the white oxide for the fabrication of nose cones used on the Navy's Sparrow III guided missile.

Resistance to the shock effect of rapid changes from one temperature extreme to another and to the accelerated erosion caused as the cones rip through rain clouds, as well as exceptionally high strength and uniform transparency to radar waves, were some of the compelling factors in this application, according to H. P. Bonebrake, manager of chemical sales for Alcoa.

VULCANITE CENTERLESS WORK AND REGULATING WHEELS

PRECISION MATES!

Centerless grinding is the highest in the art of metal finishing. Unless the work wheel and the regulating wheel have been made for each other, a *needless* handicap occurs. U.S. Rubber centerless wheels are precision-mated. The production of perfect mates for centerless grinding is a U.S. Rubber specialty.

"U.S." Vulcanite was the first rubber-bonded wheel made for industrial America. 100 years of production and research back up our present *precision mates*. The hundreds of plants that use "U.S." Vulcanite *precision-mated* wheels prove the point that to do otherwise imposes a needless handicap.

The "U.S." Grinding Wheel sales engineer will save dollars for you in your grinding operations. We will welcome a call from you at U.S. Rubber, Grinding Wheel Dept., 10 Eagle Street, Providence, R. I., or the address below.

Mechanical Goods Division

United States Rubber

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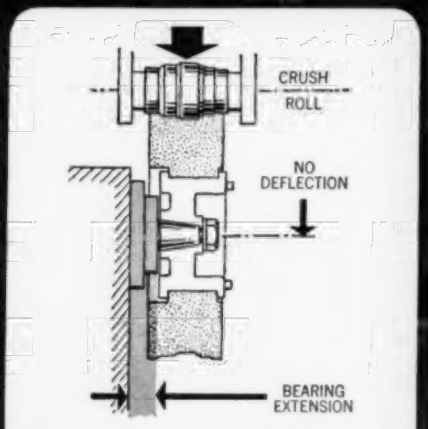
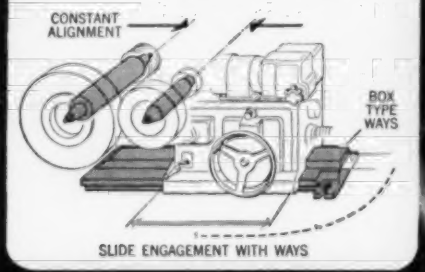
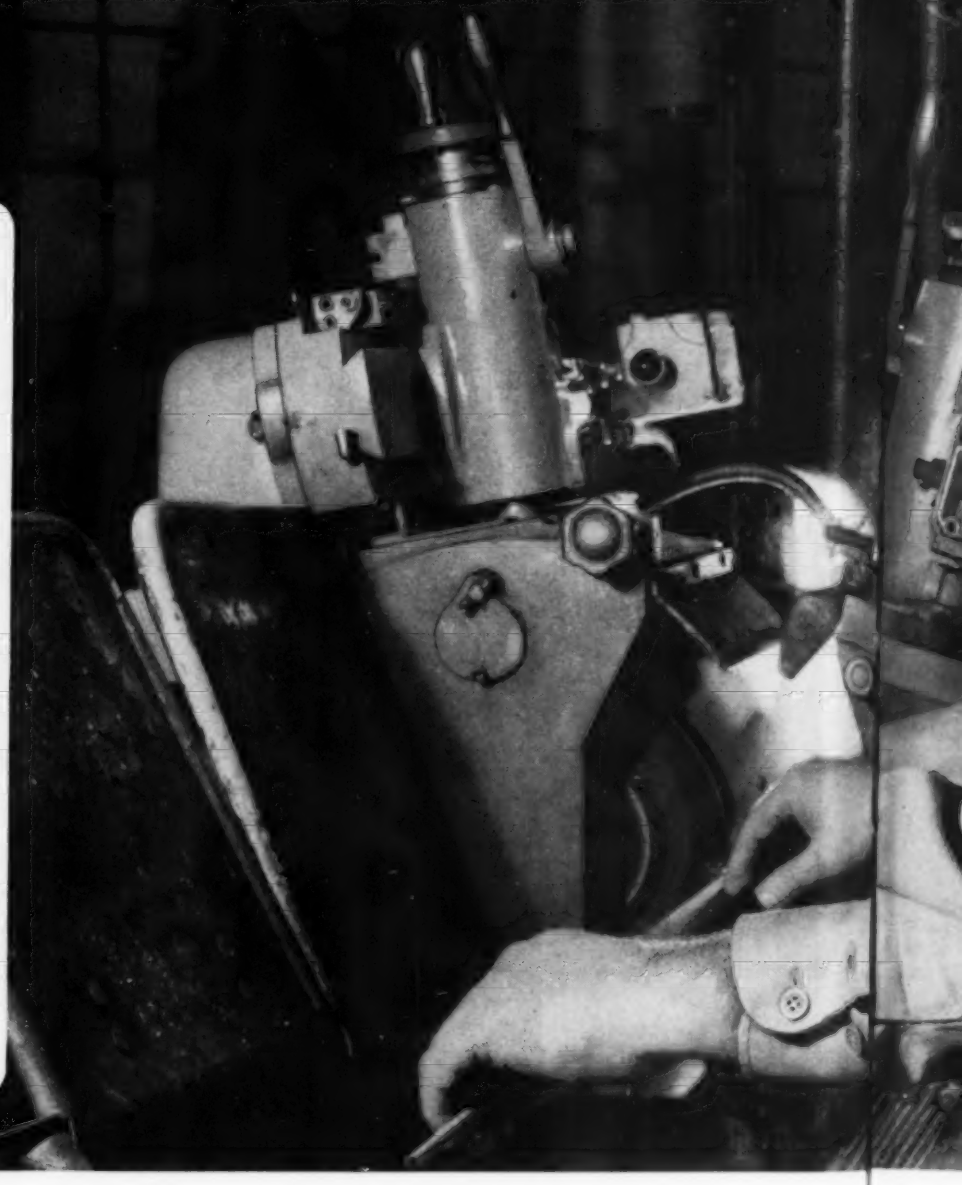
All industry is talking about the new Van Norman



Rugged, heavy Grinding Wheel Spindle with its additional bearing extension withstands the terrific pressures of crush roll forming with NO DEFLECTION.

Maintained alignment of Grinding and Regulating Wheel Spindles is assured by the high engagement ratio of the Regulating Wheel Slide length to width.





SYNTHANE PLASTIC TUBES FINISHED TO EXA
AUTOMATICALLY... ECO

VN Diversimatic Centerless Grinder delivers greater precision, finer tolera
... costs less to buy, less to

Synthane Corporation cut production costs of their small (under ½ inch O.D.) laminated plastic tubing when they switched to a VN Diversimatic Centerless Grinder. This low-priced, low-maintenance VN grinder is so exact that they can rely on machine accuracy to finish the tubing O.D.

Maintained Precision Assured—Secret of VN's exact grinding accuracy is its anti-friction grinding and regulating wheel spindles, which assure maintained precision in the workpiece under *any* conditions.

Faster Set-Ups . . . Increased Production . . . Greater Accuracy. The Van Norman Centerless Grinder is specifically engineered to produce more precision grinding work per operator per work shift . . . designed for in-feed work, th work. Th and desig

Send For VN Fra how VN and cut c

VAN NORMAN MA

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EXACT TOLERANCES ECONOMICALLY

tolerances in small diameters less to maintain

work, thru-feed work, crush form grinding and profile work. The Van Norman Centerless Grinder is rugged, and designed for heavy duty, long run production.

Send For Free Booklet—"Centerless Grinding," your local VN Franchised Distributor will be happy to discuss how VN Centerless Grinding may increase production and cut costs for you . . . call him NOW.

MACHINE COMPANY

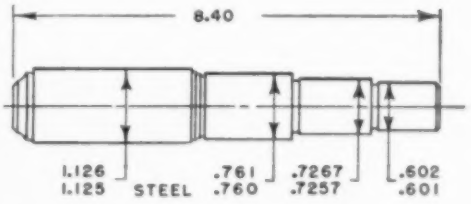
A DIVISION OF VAN NORMAN INDUSTRIES, INCORPORATED

VN

8874

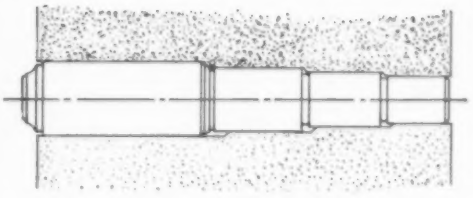
Another typical Van Norman centerless grinder cost-saving application

CUSTOMER'S PROBLEM:



A prominent automobile manufacturer wanted to grind all diameters on worm shafts. The problem was more difficult because the part did not have the same hardness throughout its entire length. Automatic cycling was required as well as post-operational gauging with feed back to machine for size compensation.

VAN NORMAN SOLUTION:



A Centerless Grinder with a Hydraulic Diamond Dresser was used to grind this part. Three operations were used because of the large amount of stock removal required, and also because of intermediate operations such as hardening and thread milling. These operations were:

1st Operation—Grind all diameters to +.012/.011 in soft state.
2nd Operation—Grind all diameters to +.002/.003 after hardening.
3rd Operation—Final grind all diameters to size.

THE RESULT:

Complete customer satisfaction. The machine functioned as planned. Production was as follows:

1st Operation—120 pieces per hour at 100%.
2nd Operation—180 pieces per hour at 100%.
3rd Operation—240 pieces per hour at 100%.

Two Van Norman machines are now in use on this job.

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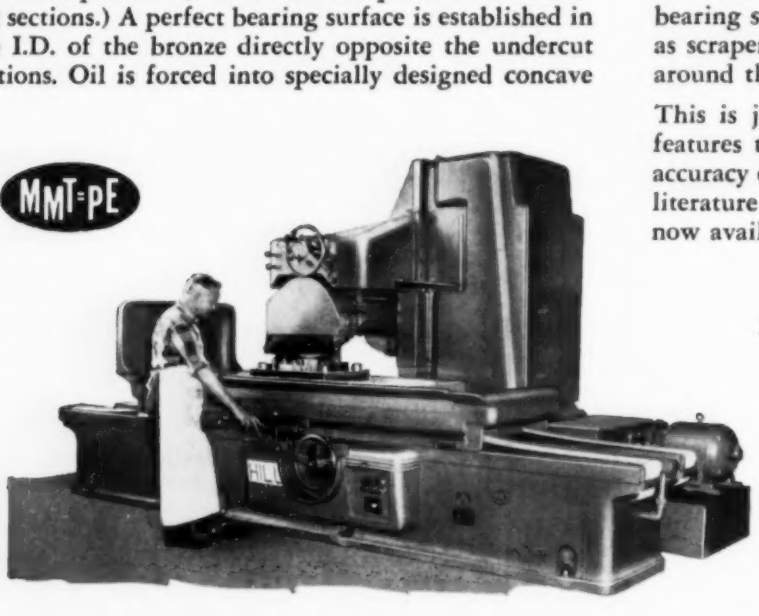
Novel Design provides *Astonishing Bearing Life*

The life of the HILL front spindle bearing on HILL horizontal spindle hydraulic surface grinders is truly astonishing. This bearing has been an *exclusive* HILL feature for more than 15 years. The necessity of replacement, under constant use, is practically unknown.

The front spindle bearing on HILL horizontal spindle hydraulic surface grinders was engineered by the HILL ACME COMPANY and has proven in the field to operate indefinitely. An alloy bronze bushing is fastened to a semi-steel casting with brass screws. The bronze bushing is undercut lengthwise in four equidistant locations on the outside diameter to allow for spindle expansion. (Darker areas in photo show undercut sections.) A perfect bearing surface is established in the I.D. of the bronze directly opposite the undercut sections. Oil is forced into specially designed concave relief areas which act as oil wedges assuring long bearing life. Hardened dowel pins guide the two halves together to their original position. The bottom half of the bearing has an oil return slot shown at the edge of the half section on the outside diameter. Note that there are NO oil grooves in this bottom half or in the quarter half of the top section. The shaft rotation spreads the oil film from the oil distribution grooves to the perfect bearing surfaces. Any additional oil grooves would act as scrapers and be detrimental to the oil film formed around the spindle.

This is just one of the many exclusive construction features that result in the longer life and permanent accuracy of HILL heavy duty surface grinders. Detailed literature on these high-precision machine tools is now available.

MMT-PE



24" x 24" x 72" HILL horizontal spindle surface grinder grinding blanking dies to extremely close tolerances. Also built in Vertical Spindle design.

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JULY, 1960

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We have recently held the second meeting of our Editorial Advisory Board. This board, which is listed on the left of this page, is your representation at GRINDING and FINISHING. We feel too many trade publications merely send their magazine to the readers, using only the letters and plant visitations as their contact with you.

Because we do not agree with the "Ivory Tower" approach and because we realize that no matter how strongly you feel about contents of this book, you cannot write us each and every time time you want to, and due to the lack of time to talk to you of more than just the immediate story material when we call on you, we have formed this board to represent your interests.

I would like to emphatically state that you have been extremely well represented. As you can tell by the list of board members, they are "your kind of people."

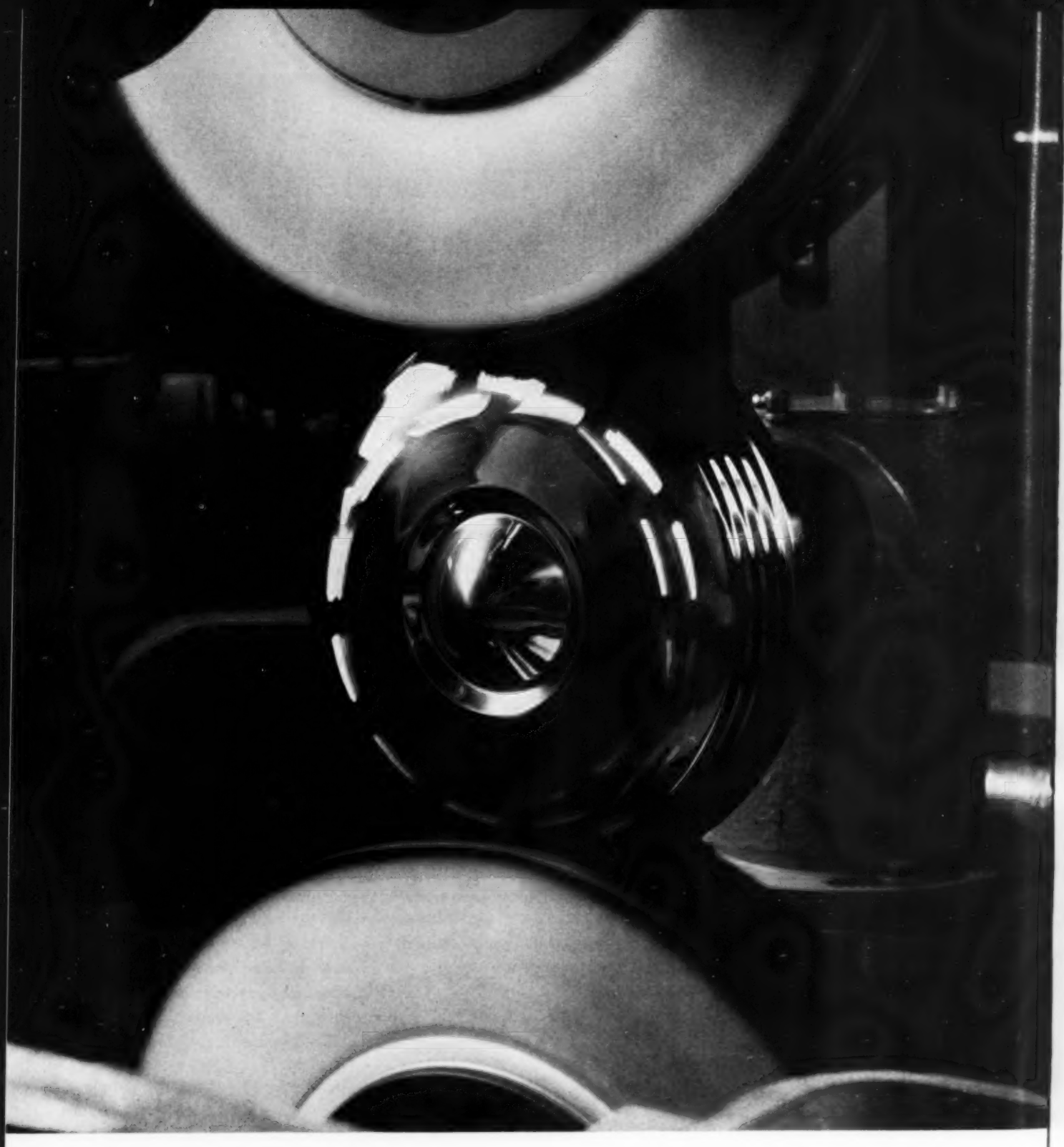
This board functions to benefit you in many ways. They have, for the most part, backed up editorial, but because we are human, they have also disagreed. The board provides us with additional practical background and an honest evaluation of story material. New ideas are brought to this group which has acted as a sounding board for these ideas.

Our more militant approach to the abrasive specialist is an example of the board's representation. Their remarks which substantiated our opinions have also cleared the path and added depth to our approach. They have acted as additional eyes and ears, substituting for many plant visits while not writing the stories.

Your representatives, the board, augment your comments received direct or on the reader service cards. These comments will continue to play a major role in guiding us in the selection of article subjects and presentation. We can now supplement your comments with hours of round table discussion with people like yourself. Please send any comments you wish to make to our offices and they will be brought to the attention of the board.

M. M. Patterson

Managing Editor



whatever your finishing problem

ACME has—or will design—a machine to solve it

Buffing automobile hubcaps with this versatile, compact Acme two-headed buffing lathe saves time, saves space and cuts production costs. Faster than ever before, and in one automatic high-speed operation this multiple station unit removes "orange peel," pits and other surface blemishes from the curved surfaces of the part. It gives the hubcap an extra smooth, flawless, high-luster finish, ready for plating. ■ This is the kind of efficiency that cost-conscious companies, both large and small, expect . . . *and get* . . . from versatile Acme finishing machines. Basic machine designs achieved over fifty years give Acme customers an advantage of selecting one of many equipment arrangements, even for the most specialized finishing applications. ■ Automotive trim, building hardware, electrical and plumbing fixtures, household appliance and kitchenware, primary metal sheets and coils . . . these are some of the many mass-produced parts and products now served efficiently by Acme machines. If you have a finishing problem call or write for comprehensive catalog today.

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With these three metronomes—or with a thousand—the time interval you choose can be positively duplicated time after time after time. And with these three PD® surface wheels—as with *all* CINCINNATI PD GRINDING WHEELS—you'll get the same kind of Positive Duplication *every time*!

HERE'S WHY . . . IN 36 STEPS

There are 36 unvarying quality control steps in Cincinnati's unique PD manufacturing process. Right from the start with the choice of the "grains" that go into a wheel, PD procedures involve exacting checks and re-checks. Every grain characteristic—from size, cleanliness, absence of foreign matter, color, magnetic content, to bulk density before and after blending—must fully satisfy extraordinary PD specifications, which are followed throughout in all 36 rigid controls.

RESULT: PREDICTABLE PERFORMANCE

You can depend on the uniformity of PD WHEELS—for each reorder wheel gives you exactly the same good job as the original. Production goes up and stays up. Costs go down and stay down. This is the promise—and performance—of Positive Duplication.

CALL CINCINNATI TODAY

Solve your grinding problems with the help of our Cincinnati-trained specialists. Their wide experience in job set-ups and grinding operations is at your service. Just call your CINCINNATI PD GRINDING WHEEL Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

PD POSITIVE DUPLICATION

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A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

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At Raytheon Mfg. Co. . . .

Grinding non-ferrous materials to fine tolerances!

This leading manufacturer of electronic systems uses new hard ceramics as microwave system components. These extremely tough materials presented a difficult grinding problem. It was solved by using diamond abrasive wheels on Blanchard No. 11 grinders. The results were outstanding: Disks measuring approximately 2¼″ x ¼″ were ground to a tolerance of ±.001″, with ⅛″ of material removed. Flatness is .002″, parallelism .002″. These parts are ground at the rate of 48 per hour, and surface finish is consistently excellent.

Write for your copy of "Work Done on the Blanchard".
THE BLANCHARD MACHINE COMPANY
64 State Street, Cambridge 39, Mass., U. S. A.

BLANCHARD

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Abrasive Engineer's Corner

ARTHUR RAKESTRAW • Contributing Editor

Effect of Tolerances on Grinding Costs

• . . . I wonder if you have ever presented an article concerned with the effect of dimensional tolerances on grinding costs.

As an example only, what would be the cost differential between grind operations on two parts whose only difference in identity was that the diameter tolerance of one was .0005" and the other .0002", assuming that the parts would be ground on the same machine?—W. K., Baltimore, Md.

An article such as this has not been published in GRINDING and FINISHING, though it should certainly be very interesting and worthwhile.

Undoubtedly, there have been countless individual cases in which very accurate time studies have produced information that would be priceless if it could be accumulated and analyzed to make it generally applicable.

The best source of such material would be the files of a management consultant, who might prepare something similar to the series, "Standard Time Data for Grinding," which recently appeared in this magazine.

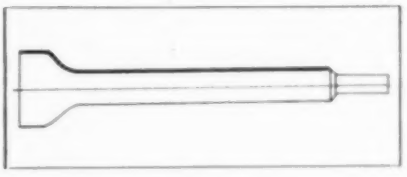
In the example you mention, assuming that all other factors were identical, we would expect a very slight increase in cost to result from changing the finished limit for roundness from .0005" to .0002". Just how much the increase would amount to, we are unable to state.

The closer the limit, the more caution would be necessary in approaching the final indicator size. This slow-up of the final stages of infeed would result in a slightly increased cost.

Polishing Stems of Titanium Extrusions

• I am interested in a simplified process utilizing a relatively inexpensive machine to remove approximately 0.010" stock from the OD of the stem of a titanium extrusion. This stock removal is for the purpose of correcting surface defects and irregularities.

These titanium extrusions are similar in size and shape to automobile valves. Stem diameters range from ¼" to ¾" but are constant on each particular part. (Sketch of typical part below.)



The stems are not necessarily straight and often have a bow from one end to the other of ⅛". This is not harmful to the part or the process.

The process we are looking for is one that will remove approximately 0.010" of stock (±.005") in a fairly uniform condition, will polish the entire stem as well as the radius and undershelf portion of the extrusion. We do not wish to straighten the stem before polish or grind, as might be necessary in a centerless grind type of operation, or in grinding against a rigid platen.—RHM, Danville, Penna.

In analyzing the problem as presented, we assume that the purpose of polishing is merely the improvement of the finished extrusion. The amount of stock removal is merely an estimate of the amount of material that might have to be taken off in order to remove certain surface imperfections. Naturally there would be no justification for centerless grinding, even if the stem were straight, when mechanical dimension tolerances were not required for the satisfactory operation of the part.

There are several possibilities which might show promising results.

First suggestion is the use of a vertical abrasive belt machine, using an aluminum oxide belt, with a semi-resilient rubber formed back-up roll to permit the polishing of the undershelf of the extrusion.

A fixture could be devised to hold the extrusion at its ends, allowing it to turn as the operator presented it to the belt. Its rotation would be controlled by the operator.

Because of the difficulties usually experienced in grinding titanium at the conventional speed of about 6500 sfpm, and the improved results obtained at 2500 sfpm, we would suggest that abrasive belt speed be reduced to something in the latter range.

A mist coolant would provide a means of reducing heat and improving the cut without the sloppy splatter of a solid stream of coolant.

The second possibility is barrel finishing. If a slight abrading action will produce the desired appearance, it might not be necessary to remove the amount of material that you have specified.

Barrel finishing, if applicable, would offer a low-cost method of handling the various sizes of extrusions at a volume rate.

Even though you may have tried this method and discarded it, we suggest that you have a small quantity processed for your examination. A number of companies maintain experimental laboratories where such runs may be made, and the entire detail of the procedure made available to you.

• • •

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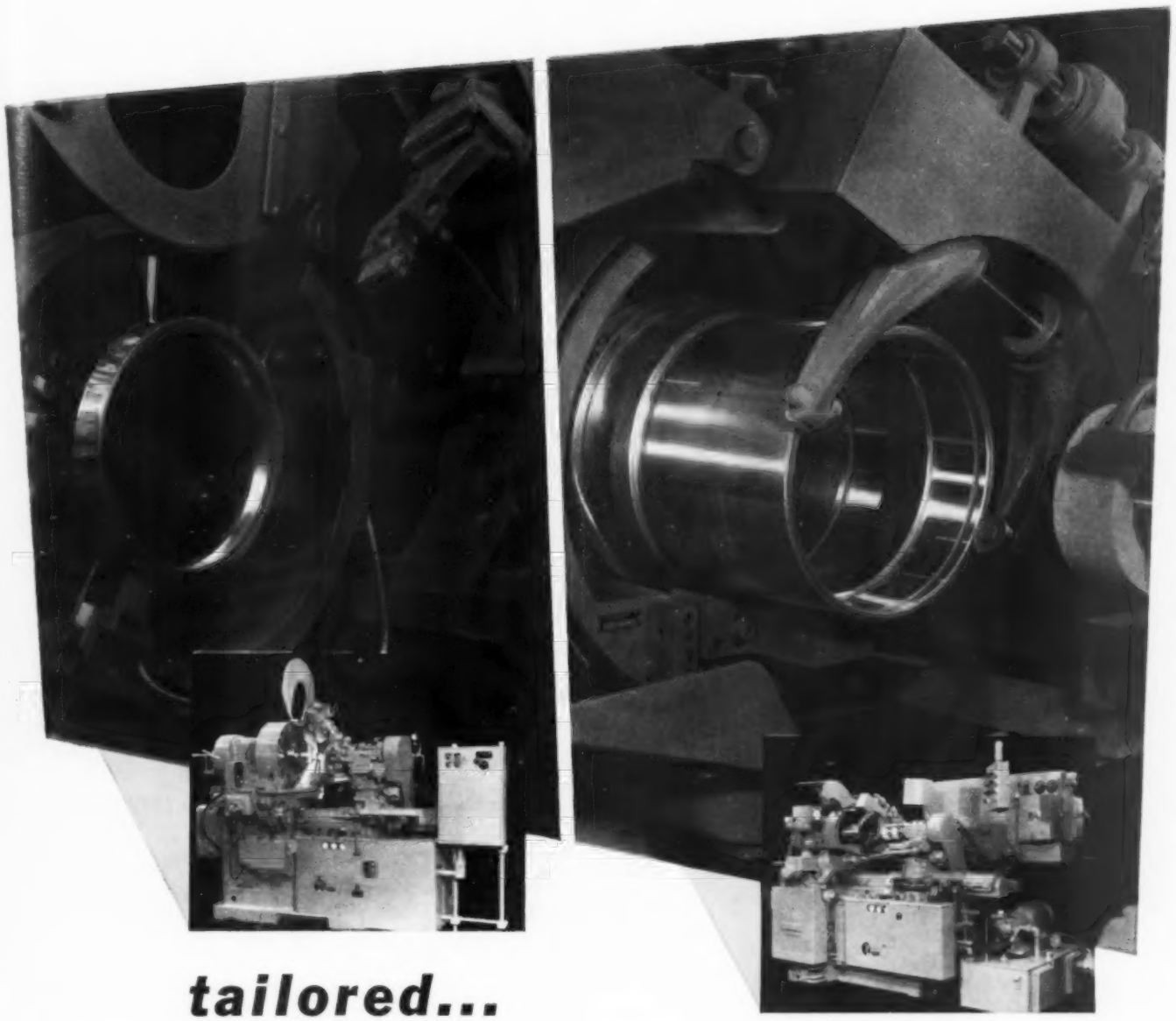

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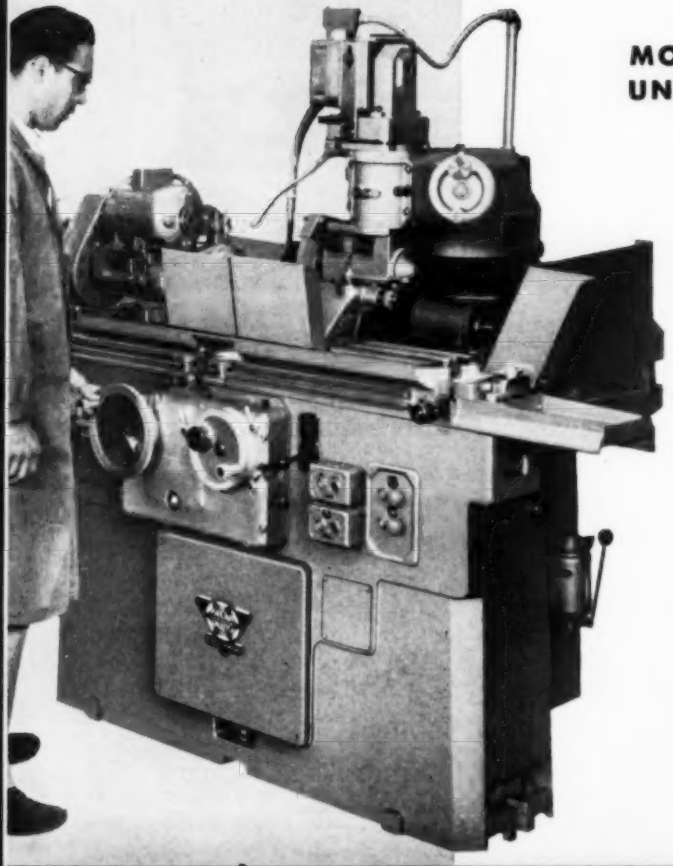
For additional information, write for Micromatic Bulletin 139W.



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Wheelhead has deep throat capacity and wheel position is centralized in relation to table. This permits surface grinding and offers special facilities for broach grinding.

The extra Universal Cutterhead extends the versatility of this highly accurate machine to cover tool and cutter grinding.

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Hand cross feed and vertical feed in .0001" increments • Auto cross feed per reversal of table of .0001" to .007" over .025" (reduction in work diameter of .050") • Automatic table traverse, 4 speeds provided. Micrometer adjustment to table traverse in .001" divisions • Wheelhead saddle on anti-friction mountings • Precision built wheelhead motor on anti-vibration mountings • Wheel spindle unit swivels full 360° • Five external grinding wheel speeds • Grinding wheels fitted on either end of wheel spindle. Nitralloy spindle runs in plain bearings • Vernier scales to wheelhead and table swivels • Fast cross traverse to wheelhead for setting purposes.

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Design for Grinding

RICHARD L. McKEE • Associate Editor

Belt Grinder Finishes Honeycomb

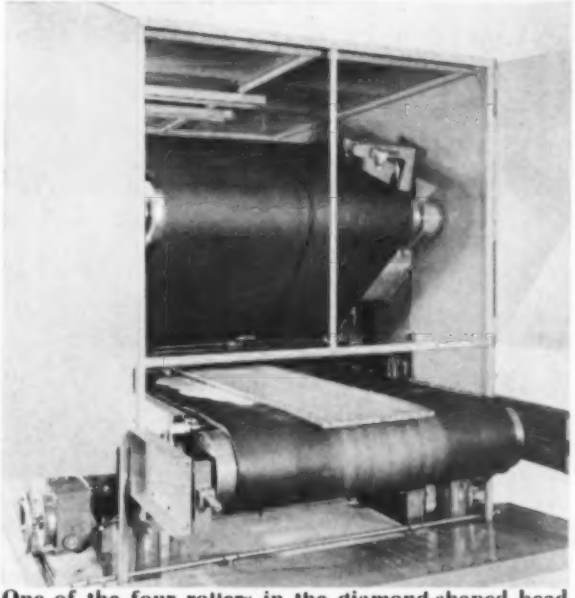
● The best method of finishing honeycomb is currently a moot question. Milling has been tried, but has not proved entirely satisfactory. Surface grinding and electrically-aided grinding have their adherents.* Abrasive belt grinding is another possibility for all high-production honeycomb grinding and is often the only feasible method with large pieceparts.

A new conveyorized abrasive belt grinding machine made by Mattison is now being used in the aircraft industry for high-production grinding of honeycomb. Equipped with a diamond-shaped head that flexes the belt as it drives, the machine reportedly holds thickness tolerances of ±.001″

Positive grain penetration is achieved through a combination of high horsepower on the belt drive and the diamond head design. Four rollers in the diamond-shaped head continuously "flex" the abrasive belt to keep it clean, cool, and free-cutting.

This versatile new grinder accommodates a 36, 48, 60, or 72-inch belt, making it possible to grind large sheets or multiple small pieceparts in one or more passes depending on stock removal. Small parts of any size may be ground because the work is held on a rubber conveyor supported by rollers up to the contact area. There is no pitch limitation as when work is fed into a pinch roll-type machine.

The conveyor bed is counterbalanced at each corner by air cylinders, and is fed up into the contact roll by six precision screws. Actuation of the screws is precisely synchronized from a common drive, assuring absolute parallelism in both directions. Bed rapid traverse up and down may be controlled by pushbutton or manual handwheel. Automatic upfeed increments of from .0002 in. to .0005 in. per impulse are available to compensate for belt wear or partpiece size. Gaging and depth setting are manual.



One of the four rollers in the diamond-shaped head of the Mattison No. 458 abrasive belt grinder can be seen above, and the slope of the belt indicates the placement of two of the others. A piece of honeycomb is shown on the rubber conveyor. (Photo and text—Mattison Machine Works.)

A variable speed conveyor drive provides a minimum speed of 6 ft per minute and a maximum of 60 ft per minute. The variable speed head drive is provided with speed changes best suited to the material, as determined by extensive belt life tests in the builder's plant.

This Mattison No. 458 can be supplied with single head, for reciprocal or single-pass grinding, or with multiple heads and straight-through conveyor. All machines are equipped with central lubrication and separate coolant system. • • •

*See "Latest in Honeycomb Grinding Methods," Bert J. Kemper, GRINDING and FINISHING, May, 1960, page 28 (surface grinding) and "Honeycomb Cores—Ground, Not Milled," H. C. Murrer, GRINDING and FINISHING, April, 1959, page 36 (electrically-aided grinding).

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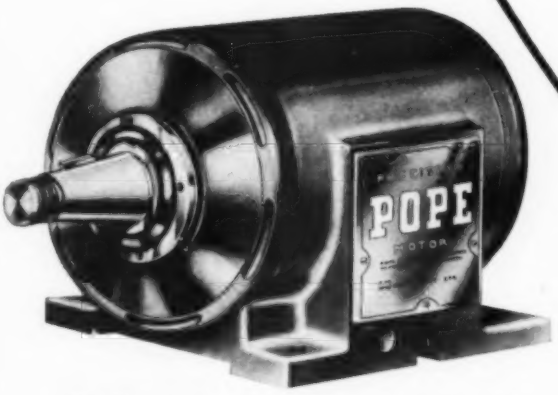

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A pair of extra large precision angular contact preloaded bearings in the rear housing are mounted close to the rotor for extra rigid support of the motor under working loads.

You can make fast convenient wiring connections from the large junction box furnished on whichever side of the motor you specify.

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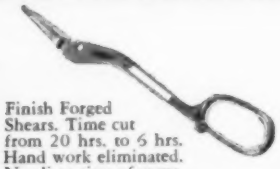

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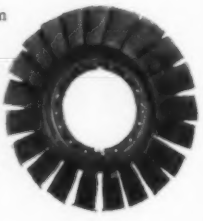

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Ideas from the Shop

Deflector Improves Coolant Flow for Diamond Truing

By H. J. Gerber

• It is a generally accepted fact that a wheel truing diamond should be kept flooded with coolant while it is in contact with the grinding wheel. It is also true that an intermittent flow of coolant may be worse than no coolant at all as it may suddenly cool an overheated diamond and cause it to crack.

On some of our surface grinders it is difficult, with the standard coolant nozzle, to maintain a flood of coolant on the diamond at all times. In an attempt to rectify this deficiency we made up a simple deflector shield and fastened it to the diamond support block.

As will be seen from the photograph, the coolant stream is now deflected upward and directly on and around the diamond point. This has resulted in a superior truing job and reduction in diamond damage.

Coolant deflector in use. Truing diamond is completely immersed in coolant.

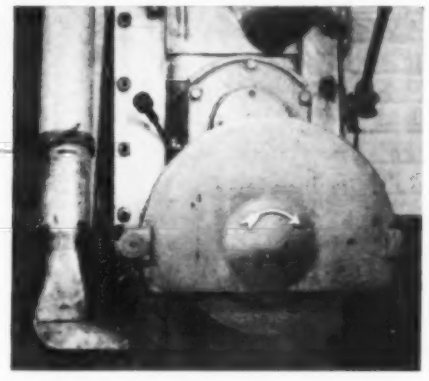
This deflector was made from a piece of scrap stainless steel sheet stock and secured to the block by two small machine screws. It will be noted that the sides of the deflector are bent inward to form a trough which further assists in concentrating the flow of coolant onto the diamond.

Send YOUR Idea to:

Ideas Editor
GRINDING and FINISHING
Hitchcock Publishing Co.
Wheaton, Illinois

Coolant deflector fastened to truing diamond support. Bent sides form a trough.

Dust Collector Attachment Speeds Cleaning of Grinder

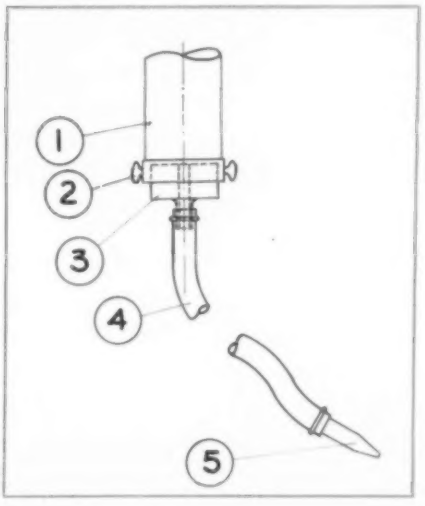


By Hal Greene

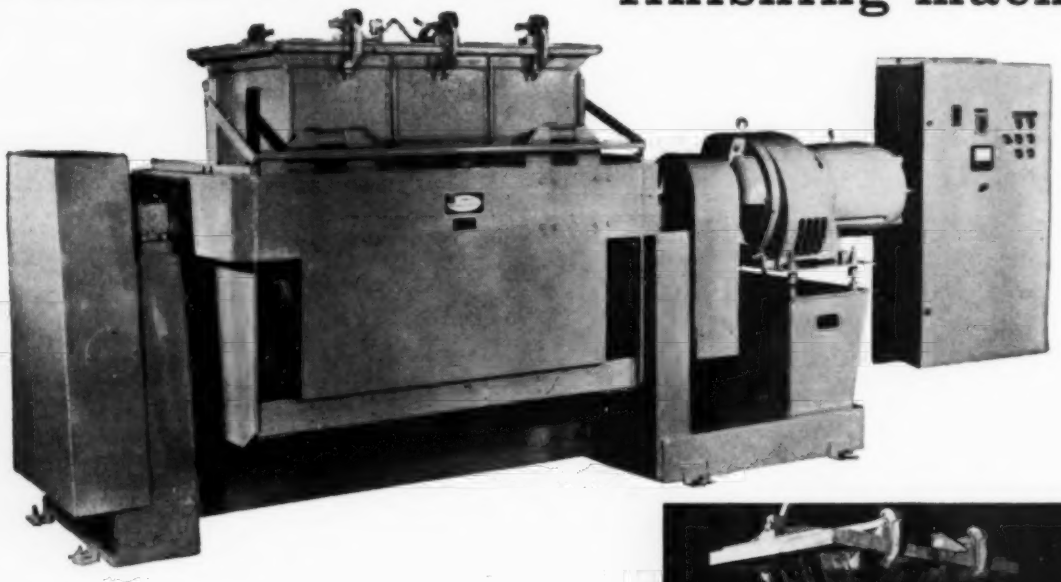
• Shown above is the typical dust collector installation for a dry surface grinder; the collector "shoe" is inserted into a swivel-type tube and fastened with a few thumb screws. Even with the best dust collecting system, some grit and dust fails to be sucked into the exhaust and the grinder must be cleaned regularly.

To facilitate such cleaning, which is a cumbersome and slow operation, a vacuum cleaning attachment as shown below can be made easily and cheaply

A length of rubber hose or flexible tubing (4) is supplied with a flat nozzle (5) on one end and is fastened on the other end to a special adaptor (3). This adaptor slips into the swivel-type collector tube (1) instead of the collector shoe. The same thumb screws (2) that held the shoe now serve to fasten the adaptor during the cleaning operation. • • •



what makes LORCO® the outstanding vibratory finishing machine?

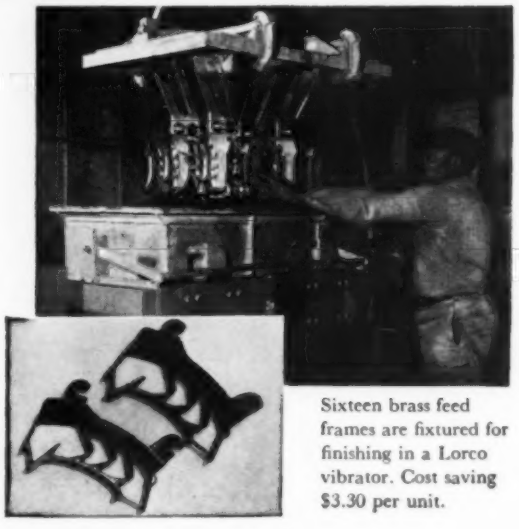


ANSWER: Lorco builds outstanding performance into its vibratory finishing machines by providing those extra quality features that our long experience has shown pay off in better finishing results and lower finishing costs.

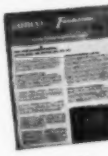
The Lorco lubrication system, for example. There is less costly equipment to lubricate the main bearings—but Lorco gives you an Alemite Oil Mist system that keeps foreign matter out of the vital bearings while it lubricates. And the Lorco *detachable* bowl construction—heavy gauge steel plate, all welds stress relieved by heat treatment, entire surface shot peened, with extra durable calendered rubber lining vulcanized to the metal.

Design features like these have proven their worth to over a hundred users, large and small, including many plants now operating several Lorco vibrators. At lowest finishing cost, and with minimum operating cost, these plants are achieving results that would be impossible with any other kind of equipment.

The F.J. Stokes Co. of Philadelphia, Pa. is typical. The parts illustrated at right formerly were filed, ground and buffed by hand, at a cost of $4.00 per piece. With a Lorco vibrator, they now deburr and finish these parts in record time, at a total cost of only 70¢ each, including all labor, operating and overhead costs.



Sixteen brass feed frames are fixtured for finishing in a Lorco vibrator. Cost saving $3.30 per unit.



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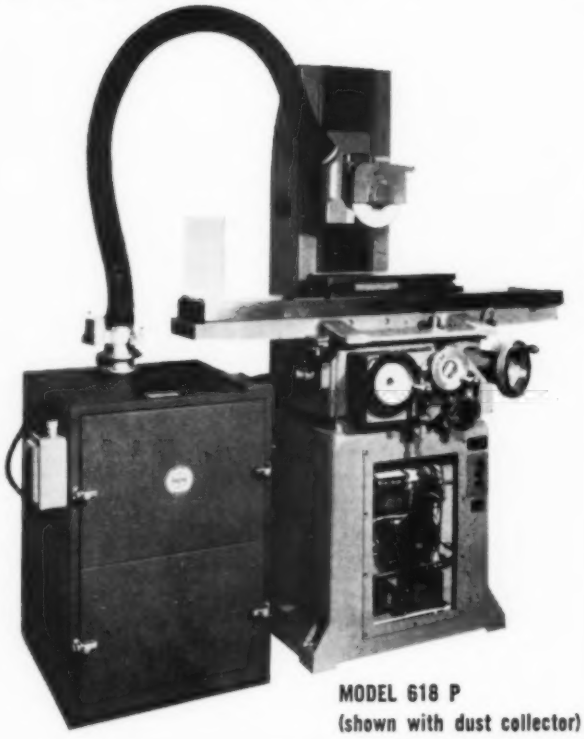
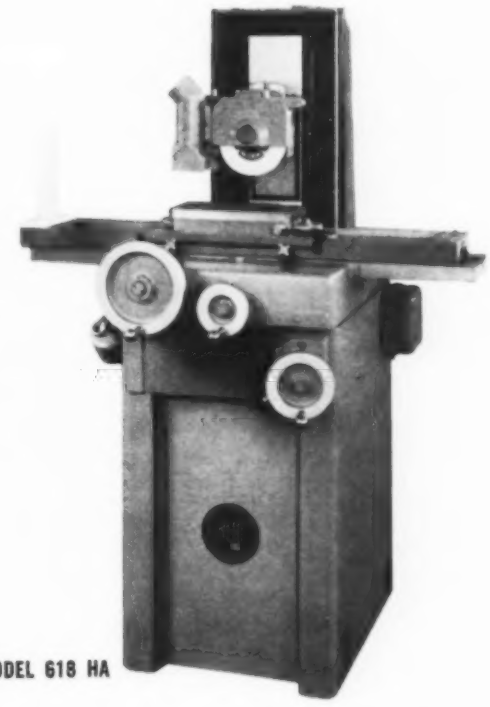


MODEL 618 P
(shown with dust collector)



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The New *REID 618HA*, a hand operated model, provides extra high 15¼" working height under a 7" wheel . . . one shot lubrication . . . heavy one-piece cast iron base.

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1 General Electric Man-Made diamonds are of uniform shape and structure within a given size range. This uniformity, assured by controlled manufacturing processes, results in superior performance.

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3 General Electric Man-Made diamonds are tailor-made with controlled, consistently high quality – a uniformity which assures a production bonus in wheel life and work output.

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American Society for Abrasives

Connecticut Chapter

John McShea was elected president and **Harold Rivers**, vice president at the Annual Meeting of the chapter, held on April 25 at the Sun Valley Restaurant, Meriden, Connecticut.

Other officers elected were **Bert Broekhuysen**, secretary, and **Andrew Saman**, treasurer.

Directors: **Pat Pascucci, Warren Hessels, Charles Sadler,** and **Stan Bozek,** with **Jim McGregor** and **George Farren** as representatives of the sustaining members.

Speaker of the evening was **Eugene V. Grumman**, of the Bullard Company, Bridgeport, Connecticut, who discussed the importance of people in industry.

The chapter's first scholarship award —the first in the history of the Society —was presented to **Lawrence Frank Bowen**, School of Engineering, University of Hartford.

Chapter membership was reported as 144, 7 of whom had perfect attendance and 42 perfect non-attendance. Average attendance at meetings for the year has been 75.

The last meeting of the year, a golf outing, was held May 23 at Grant-Mor.

Cleveland Chapter

Officers of ASA's fourteenth chapter are the following:

Joseph Cognata, president; **Ernest Puschaver,** first vice president; **George Wassel,** second vice president; **Paul Wilson,** secretary; and **Roy Abbott,** treasurer.

Members of the Board of Governors are: **Art Baehr, O. K. Cook, George Croninger, Gus Michul, Dick Joyce, Ted Sipe,** and **Bill Martin.**

Hudson-Mohawk Chapter

Howard McAleer, president of Formax Company, Detroit, discussed buffs and their applications for various types of materials at the April meeting.

A series of colored slides depicting the areas in which sisal is grown and the processes for converting it into buffs completed the program.

..... The Family Grows .....

Connecticut	141 members
Detroit	111 members
Cleveland	91 members
Chicago	88 members
Pittsburgh	88 members
Delaware Valley	72 members
Long Island	53 members
Reading	52 members
New Jersey	48 members
Flint	41 members
Hudson-Mohawk	40 members
Boston	36 members
West Michigan	32 members
West Mass.	28 members

(Above figures as of April 30, 1960)

Western Massachusetts

Perry Goodell of the Chain Belt Company was elected president of the chapter at a membership meeting May 16.

Outgoing president **Sam Finnell** praised the members for their selection. Goodell's work in the chapter since its origin, Finnell told the members, merited a good deal of praise.

Other officers elected included **Jim Heggie,** vice president; **Carl Bowers,** treasurer; **Otto Ebelt,** secretary; and **Fred Oginz,** corresponding secretary.

At the meeting, the final one until fall, each member was urged to bring in a new member, preferably a **user,** to increase membership in the chapter.

Long Island Chapter

Vern Childers, special service engineer with the DoALL Company, Des Plaines, Illinois, spoke on "Fundamentals of Tool Room Surface Grinding" at the June meeting, held Wednesday, June 8, at the Wheatley Hills Tavern, Westbury, New York.

Mr. Childers emphasized the importance of surface grinding as a finishing operation in present-day requirements. He covered the increased demand for closer tolerances, relating this to the need for maintaining wheel form and size, and for controlling the temperature of the workpiece.

A film, "Techniques of Surface Grinding," was also shown.

Chicago Chapter

Election of officers was the major order of business for the Chicago Chapter at the June meeting, Thursday, June 9, at Nielsen's Restaurant, Elmwood Park.

Robert Hanke, Shafer Bearing Division, Chain Belt Company, is the new president, with **Robert E. Etherton** of Cortland re-elected as first vice president, and **George Miller** of Continental Drill as the new second vice president.

Henry Hoppe, of Touchdown, Inc., a division of Redson-Rice Corporation, continues as secretary. **Joseph Carr,** of Bay State, is the new treasurer.

On the Board of Governors are **Stanley E. Ziegler,** Chicago-Latrobe, ex-president, and **James E. Marek,** Chicago Screw, former second vice president and program chairman, together with newly-elected **John Seguin** of Norton; **John T. Davis,** Cortland; and **M. M. Patterson,** GRINDING and FINISHING.

During the meeting a plaque was presented to Stan Ziegler in appreciation of his efforts in leading the chapter in its first year. The growth of the chapter (to over 100 members, by chapter records, 88 according to National) was particularly noted.

Jim Marek, chairman, was commended for the organization of the programs and high quality of the speakers during the past year.

The July meeting will be a golf outing, at Cog Hill Golf and Country Club, 119 South Archer, Lemont, Illinois, Saturday, July 9, starting at 11:00 a.m. on the No. 2 course.

Reading Chapter

John H. Olson and **Horace Ashenfelter III,** technical service representatives of Engelhard Industries, teamed up to discuss natural diamonds and their applications in industry. They also presented a film, "The Mining of Natural Diamonds."

Detroit Chapter

Walter Burkhart, assistant manager, Machine Tool Division, The Sheffield Corporation, Dayton, Ohio, spoke on "The Crushtrue Grinding Process" at a recent meeting.

Here are thread and form grinders that give you toolroom precision plus production line speed.

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Sheffield's versatile standard Thread and Form Grinders (Model 101, illustrated, capacity 7″ diameter x 12″ long; Model 103, 7″ diameter x 24″ long) are equally at home in the tool room making one of a kind precision threads, or in the production line plunge grinding thousands of threaded or profiled parts.

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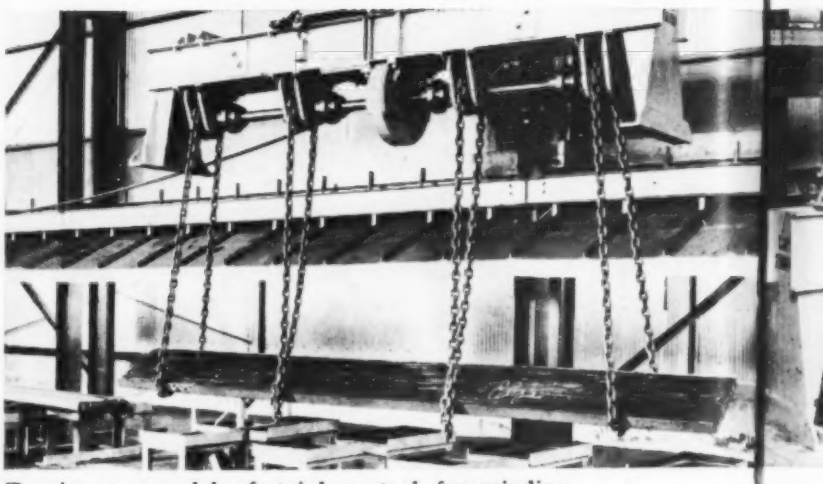
Motorized Turnover Device Aids Slab Grinding

● Slabs of stainless steel can be turned readily to any desired position with a specially-designed motorized slab turnover device at the plant of the Empire-Reeves Steel Corporation, Mansfield, Ohio.

The device is used in turning the slabs in order to grind their surfaces to remove any imperfections. The slabs are then rolled into coils of stainless steel.

Designed and manufactured by the Materials Handling Division of Heppenstall Company, the device consists of a double burden bar that supports four heavy endless chain slings and motorized equipment for turning the chains. Slabs less than 14 feet long are handled by the two center chains, which are on 6-foot centers. The two outer chains, which are 14 feet apart, are used to handle longer slabs. The device, with a capacity of 25,000



Turning over a slab of stainless steel, for grinding all sides, is easy with this specially designed device. The outer chains, 14′ apart, are used for long slabs. Inner chains are 6′ apart.

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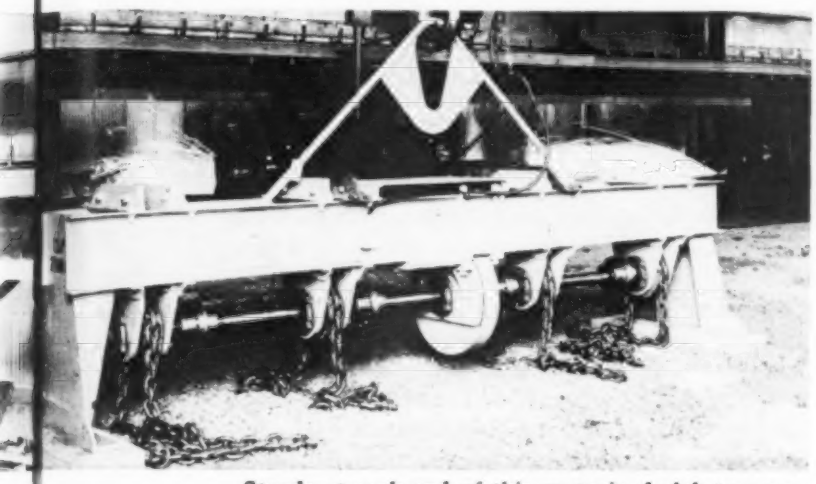
pounds, is engineered to handle slabs up to 50 inches wide. Similar turnover devices can be designed for other capacities.

Turning of a slab, as well as raising and lowering of the device, is controlled entirely by the crane operator from his cab. The motor drive, housed within the burden bar, operates the gear reducer, turning the main drive shaft at a predetermined slow speed. The chain pocket wheels keyed to the shaft result in a positive drive for the chain slings, and can operate through 360 degrees.



Stands at each end of this motorized slab turnover device permit it to rest flat on the floor when not in use. Sparks from grinding a stainless steel slab can be seen in the background.

Four chains, each with a capacity of 12,500 pounds, are available to pick up a slab. Either the two center chains or the two outer chains are placed under its ends, allowing the other two chains to hang without a load. For machine grinding, the slab is lowered until it rests flat on a series of tables, the chains are removed, and the turnover device is moved away. After one side is ground, the slab is turned in order to put the other side in position for grinding. For grinding its edges, the slab is turned edgewise and lowered between the tables. For finish hand grinding, the slab is lowered over "A" frame supports.

After grinding, the slab is carried to the strip mill, where it is lowered on to a conveyor and the chains are removed. The turnover device is then ready to pick up another slab in the slab mill.

The device is designed with a stand on each end so that it will rest flat on the floor when not in use.

Empire-Reeves Steel Corporation is a producer of ingots, plates, cold rolled sheets and coils, and silicon sheets and coils, with a capacity of 500,000 ingot tons per year. It is a wholly-owned subsidiary of Universal-Cyclops Steel Corp., Bridgeville, Pa.

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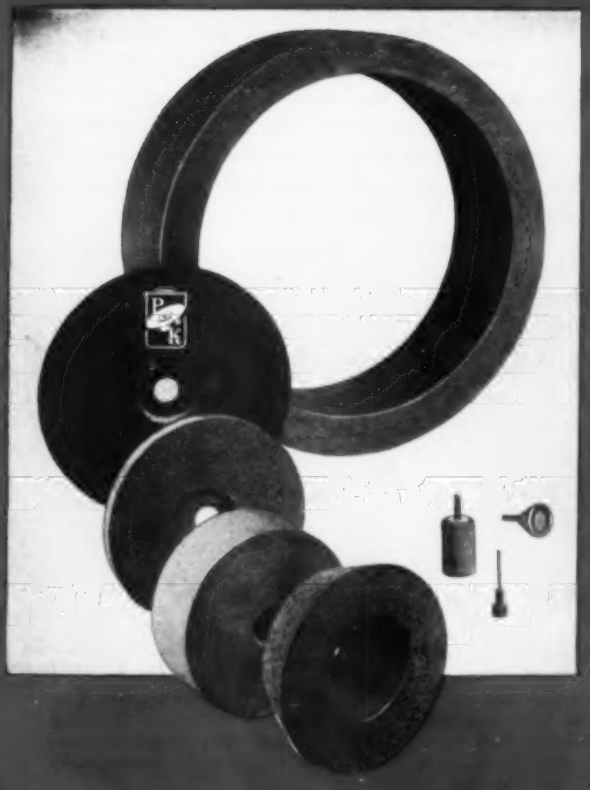

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Proper Techniques

Figure 2. The double faced lapping machine is a DoALL Model CM-16. It can be used with 16" laps of either steel or black granite. The lower lap may be driven at any speed from 10 to 50 RPM. The upper lap may be released to rotate when desired and the eccentricity of the spider may also be adjusted as required.

by ROBERT T. CAPANSKY
Supervisor Lapping & Honing
Weston Hydraulics, Ltd.
Van Nuys, Calif.

● Investigation to improve flat lapping falls primarily into two categories. The first is the selection of the best type of flat lapping equipment for the particular job; and the second is the improvement of the technique used in each particular case. Both of these have yielded spectacular results at Weston Hydraulics.

Flat lapped surfaces are increasingly important to our industry. They roughly fall into three classes: low pressure fluid seals such as those found in power transmissions and similar devices; seals and valve parts for general hydraulic and pneumatic system use; and, very high pressure seals and valve parts used in hot gas systems and high energy pneumatic systems. The first of these in some cases may require a finish no better than five (5) microinch, dimensional tolerances in thousandths and no parallelism consideration. In contrast the very high pressure seals used for hot gasses regularly require surface finishes of better than one microinch, dimensional tolerance of plus or minus one tenth-thousandth, and parallelism held to fifty-millionths or closer. The problem is complicated because all three of these requirements must arrive at their desired state at the same instant. For instance, if the dimension and parallelism has been achieved without the required surface finish, continued lapping for finish will in most cases carry the dimension below its low limit.

Lapping is probably the oldest method used to achieve extremely fine surface finishes and very great accuracy. Doing this in the tool-room or in the laboratory is very different from producing it under production conditions. Production sched-

Figure 3. Comparison of lapping techniques on a nylon valve part, actual diameter 1-3/16". The part on the left was lapped on a single surface lapping machine with cast iron laps. Particles of swarf are imbedded into the surface. These are not removed by continued lapping. The center part was lapped on the double surface lapping machine, also using cast iron laps. Although the amount of imbedded material has been reduced, some still remains. The right part was lapped on the double surface lapping machine but black granite laps were used instead of cast iron. The resulting surface is completely free of foreign material.

egroaden Lapping Applications

Production lapping presents many problems. Selection of types of machines and careful evaluation of techniques will greatly enhance the use and increase the applications of the lapping method.

ules cannot be met unless equipment and personnel is used efficiently. Slow methods of stock removal cannot be tolerated where stock should be removed rapidly by a safe method. On the other hand, scrap losses can exceed production gains if sufficient care is not used, particularly for parts requiring fine finishes and close tolerances.

In order to meet these divergent requirements Weston Hydraulics uses three types of equipment for flat lapping. These are the single surface bowl type machines that are associated with the optics industry, the large single surface machines found in metalworking industries, and the double surface type of machine. Each of these has applications in which it particularly excels; and in many cases a lapped surface is begun on one of the machines and finished on another. In order to get the most from these machines we found that it was necessary to establish our own capability parameters rather than rely on the manufacturers' catalog specifications.

The optical type machines are particularly useful for very small parts and particularly where these parts must be finished to the greatest accuracy and highest degree of surface finish. The limitation of this equipment is primarily in the speed of lapping, as is true with single surface lapping in general; and it is also limited in the size of the load that can be lapped at one time.

The large single surface lapping machine that we use has a 30" diameter lap. In contrast with the optical type machines, a very large load can be lapped at one time and large individual parts are also easily lapped. It is very useful for lapping flat surfaces that do not require the highest surface finishes. It is frequently used to prepare work for the optical type machines. When much stock must be removed, the work must remain on this machine for a very long time, as will be seen in the examples given later.

An explanation of types of surface finishes required should be made at this time. The manufacturers of all lapping machines assert that their machine is capable of producing a certain finish. These claims are usually factual under proper lapping conditions. However to produce a flat mirror type surface absolutely void of scratches in the complete proximity of the seal area when inspected under a 30 power scope (figure 4) a new classification of surface finishes is created. The structure of the material enters into the picture, the heat treat of material, and the cold stabilization establish the capability of the material to assume a flat mirror type finish. Although a surface may have a matte type finish measuring less than five (5) micro inches it is almost impossible to produce a finish of one (1) micro inch or less and completely void of scratches or dubbed off edges unless certain techniques are employed which usually causes the lapping machine to eliminate itself.

The double surface lapping machine (Figure 2) was the most recent acquisition of the lapping department. It was added to fill the finish and accuracy gap that existed between the two types of single surface lapping machines. Furthermore it was intended that the faster lapping operation which is possible with double surface equipment would diminish the work load on the other machines, thereby permitting them to be used more efficiently.

In some cases this has resulted in large improvements. For example, a valve poppet was originally lapped completely on the optical type machines. Two to three shifts of eight hours each were required depending upon the amount of stock left from the grinding operation. These parts are now lapped completely in the new machine using upper and lower laps. A load is now lapped in approximately two hours.

Another, and more difficult part, was a hydraulic seal. These parts were rough lapped on the large single surface machine and then finished on the optical type machines. A lap load of 19 parts required a combined machine time of 10 to 12 hours. They are still finished lapped on the optical type machines; but the combined time using the double surface lapping machines for roughing is now 2½ hours. In addition the lap load has been increased from 18 to 24 pieces.

The double surface lapping machine that we are using is a DoALL Model CM-16. Mineral laps are available for this machine and are par-

Figure 4. Parts are checked periodically during lapping with a Bausch and Lomb Sterio-Microscope. It is necessary to control the rate at which the surface finish is developed so that the final dimension and desired finish are achieved simultaneously.

ticularly suitable for nonferrous lapping. They are produced from the same black granite that is used for DoALL surface plate. The use of this machine with black granite laps has been particularly helpful in improving the lapping of nylon and teflon parts.

One of the problems encountered when lapping parts of nylon and similar material is the tendency of the part to pick up metallic particles abraded off of the laps. Obviously the iron laps are worn away during lapping and the minute particles are carried by the lapping fluid or paste along with the abrasive. The degree with which they are imbedded into the plastic varies with the method of lapping.

In Figure 3 is shown a comparison of a valve part lapped by three different methods. The part on the left was rough lapped on the large single surface machine and finished on the optical type machine. This required 20 hours. In production this method ranged from 16 to 24 hours depending upon whether the part was at its high or low limit before lapping. The center part was lapped with the double surface lapping machine using iron laps. Although the time was cut considerably the part has picked up iron particles.

The part on the right was lapped with the double surface machine equipped with black granite laps. As the photograph shows, it is free from foreign matter picked up from either the laps or the abrasive. .002" of stock was removed in lapping. A 12 micron abrasive (aluminum oxide) was used for roughing. That operation required 45 minutes. The part was taken to within a half thousandth of the final size in the roughing operation. The finishing operation used 5 micron abrasive and required 30 minutes. During that operation the part was brought to size and the desired surface finish established simultaneously. In production some of the lots will be at the low limit and therefore require less roughing time. As a result the average time by this method is one hour in comparison with the 20 hour average by the former method. The finish was also improved. The part on the left has an 8 RMS finish, center part 6 RMS, and the part lapped with black granite has a 5 RMS finish.

The times stated represent more than machine time. The parts are repeatedly checked during lapping. This required that the machine be stopped, a part removed, cleaned and measured with a comparator. Often it is necessary also to check the surface finish with a sterio-microscope (Figure 4). The laps themselves must be regularly checked for flatness, and dressed when necessary (Figure 5).

All of these operations offer opportunities for methods improvements and many have been found. The design of the lapping spider is one of many examples. It contains three concentric rows of openings for the parts; but each row contains enough for one lap load. The parts are started in the outer row; and as the lapping progresses they are moved to the inner rows. This decreases the total lapping time, gives a higher degree of control during the final few minutes, and tends to decrease the amount of dressing required. Although the laps are checked several times a day, they seldom require lapping more than once a day for nylon and twice a day for steel parts.

Various means have been found to speed the dressing operation, too. If inspection shows that the parts are slightly concave but close to the finished size, they can be turned over for the final few minutes to finish and correct at the same time. If this condition persists, the laps are dressed, of course. However, if the dressing fails to remove the concave condition, the upper and lower lap can be interchanged to remedy it.

• • •

Figure 5. The laps are inspected frequently for flatness. An optical flat and monochromatic light is used for this purpose as shown in the insert. When redressing is required, they are run together using fine aluminum oxide abrasive until restored to flatness. The insert also shows the construction of the eccentrics that move the spider. By loosening the cap screws each may be swung within the limits of its slots.

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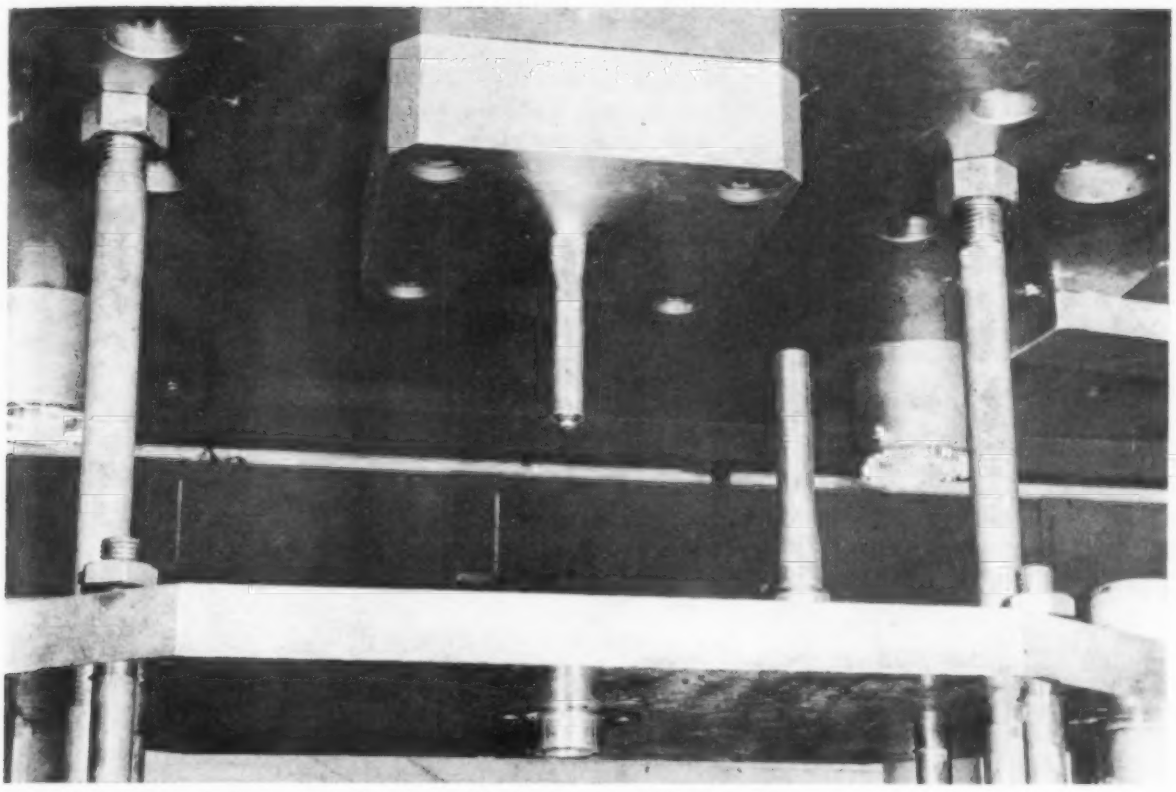


Typical punch and die set up for hand-fed single-part cold extrusion operation. Dimensional tolerances of parts are maintained by holding punch and die in proper relationship with aligning pins which guide upper unit as it comes down against lower member.

Secrets of Carbide Die Finishing

By **WALTER B. PANKO**
Hyprez Division, Engis Equipment Co.

● Diamond compounds play an important part in the successful operation of modern techniques of cold extrusion, according to A. W. Pommerville, Chief Engineer, and Robert W. Gardner, Senior Engineer, Research and Development Center, Verson Allsteel Press Company.

Basically, cold extrusion or plastic flow is nothing more than the application of sufficient pressures to the material, confined within tooling, to produce plastic deformation. Pressures must be great enough to force the material to flow through orifices created by the tools. Shape and size so created does not change unless the object is again subjected to additional pressure. Thus product size, shape and finish, are created in one operation (sometimes of several steps) with no waste of material and a very considerable saving of time as compared to conventional machining-cutting-grinding production techniques.

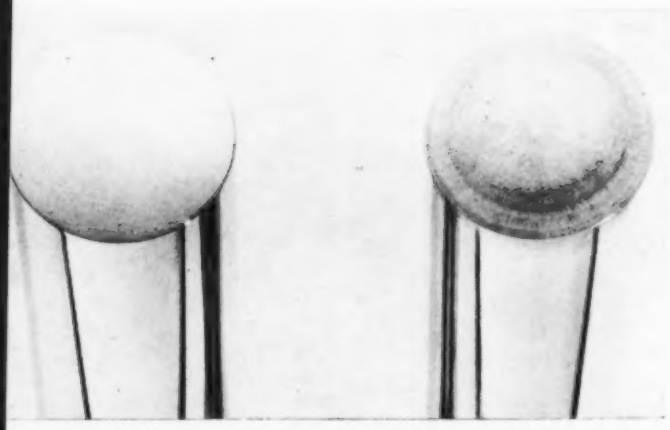
In addition, by taking advantage of the cold working properties of the alloy being used, a material with 54 Rockwell "B," for example, might be increased to 80 Rockwell "B" by the phenomena of work hardening.

At the Verson Research and Development Center, constant experiments are being made to evolve new techniques, better punches and dies, better die design, and improved lubrication techniques. In addition, the Research Development Center works closely with Verson's customers to design dies for their products and to set up automated equipment to deliver blanks to the dies and remove finished parts in the cycle.

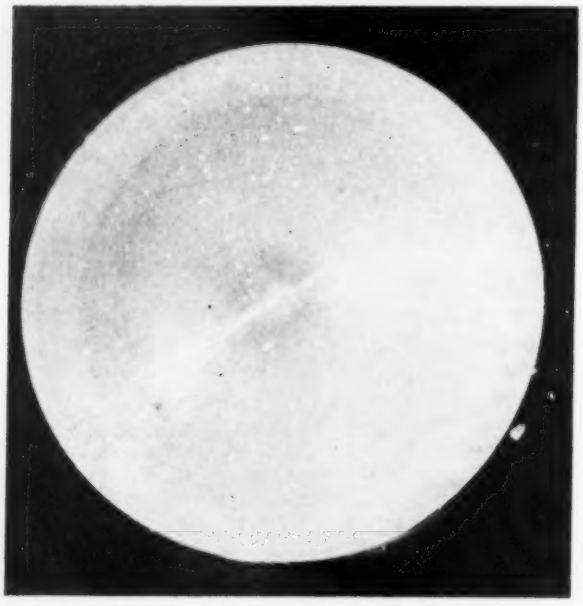
Extruding grades of carbides have been developed for applying this process to the harder steel alloys, so that cold forming is not now limited to softer materials such as aluminum, but is feasible also with virtually the entire range of steels used in industry.

Because the size or shape of the product will not be changed after it leaves the die, unless subjected to additional pressures, the frictional area of the tooling must be kept at a minimum in die design—and surface friction of punches and dies must also be minimized.

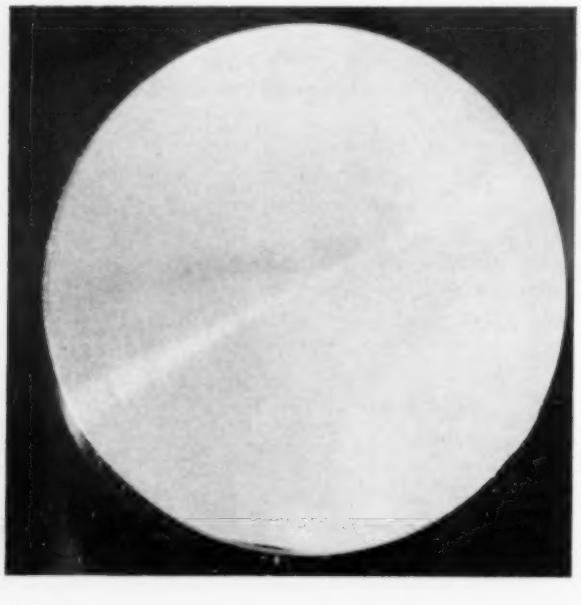
All nicks and scratches of any kind should be removed from the surface—not only because their contours would be impressed in reverse on the product, but because they will pick up lubricant, dirt, or metal and produce deformed parts.



Typical punches used for cold extrusion operations in Verson Allsteel Presses. Punch at right has not been finished. Punch at left has been finished to 4 micro-inch finish with diamond compound.



Ends of the same punch enlarged show conditions before (above) and after (below) finishing. In order to achieve the necessary finish, diamond compounds are used in sequence, starting with a coarse grade and following with grades containing finer micron sized diamond particles. Exact grades will vary with specific circumstances, with material being finished and the finish required.



Further, when the punch or die is in this condition, it works less freely, causes increased tonnage and has reduced life.

Under the high pressures of cold extrusions, punch temperatures reach the range of 300°—400° F., with momentary surface temperatures during extrusion impact ranging up to 1000° F. Sometimes temper color will show on the surface of the steel punch. For obvious reasons, steel punches and dies won't handle the work in some situations; so Verson has found that tungsten-carbide suitable for extrusion provides the answer. However, being harder than steel these tools make it necessary to use diamond compounds for lapping and finishing to achieve the mirror finish required in the cold extrusion process.

According to Bill Pommerville, "Diamond compounds are the only thing that has been tried that will cut carbides properly for extrusion tools. They provide a clean cut, with no burnishing. When used on steel, diamond compounds cut faster and give us a superior finish."

Verson recommends that punches and dies be given a mirror finish, with frictional surfaces of dies finished to 4 micro inches and the frictional surfaces of punches finished somewhat finer. They check surface finish with a 25X microscope to prove that all scratches and depressions are removed, leaving a shiny surface to the eye. For finer finishes, a 250X microscope is used.

According to Pommerville, as soon as nicks or scratches appear in the finish, lubricant and material become imbedded, friction goes up, stress increases under the cold forming pressures, and early tool failure results.

The finish of the profile or nose end of the punch is critical. Any roughness on the surface, or any sharp edges or corners will break through the lubricant on the surface of the blank and cause galling and increased pressure. In backward extrusion—where the material flows from the end of the punch upwards around the shank—any grinding or other marks will create stress raisers and punch failure. Punches, of course, are lapped to prevent any obstruction of the flow of metal. Finish required for the inside of the die is usually similar, though not so critical. However, poor finish will cause excessive tool friction.

Punches are lapped in a lathe at a speed of 450 to 500 rpm. Coarse Hyprez compound, grade 45-OS-30, is impregnated into a laminated hardwood lapping stick with a 45° bevel.

Blanks used to produce parts in cold extrusion have phosphate lubricant coated on and chemically embedded in the surface. When it is considered that in a particular extrusion the surface of the slug or blank is stretched out as much as 27 to 1, and that the lubricant must be finished evenly over the new surface, the finish of the tool becomes even more important.

Die designers burn the candle at both ends trying to avoid sharp corners, undercuts, set-backs or other awkward shapes which would not permit free and even flow of the material and which would tend to break through the lubricant at that point, thus creating a part with a potential weak spot.

Part of the answer to maintaining lubricant distribution comes in staging the extrusion in two or more steps, first pre-shaping or coining the blank and then completing the extrusion with another pass. If this can be done on an indexing fixture so that the part is preshaped and then finished before it age hardens, no intermediate annealing is required. Here again, the finish of the die and punch are an important factor in reducing friction, in maintaining lubricant on the surface of the slug, and in imparting the correct shape to the piece.

Verson is using diamond compounds to finish both steel and carbide tools. On high speed steel punches and dies, diamonds provide a time-saving over other abrasives, and cut clean rather than burnish. Clean cutting is essential to aid in the plastic flow of the metal in cold extrusion.

According to Pommerville;—"In our choice of a diamond compound to finish these dies and punches, we find it a definite economy to buy top qualtiy. For uniform finish, it is imperative that the diamond particles be critically and accurately graded, and that the vehicle be so compounded that it will maintain permanent suspension and uniform distribution of the diamond particles so as to maintain maximum and predictable cutting action."

To achieve the 4 micro inch finish generally required, Hyprez Diamond Compound is used in the initial lapping operation following the final grinding operation. In order to remove the grinding marks, it is sometimes necessary to remove .0004" or .0005" of material in the first lapping, using a fairly coarse, 45-OS-30 grade compound.

In order to obtain the final finish, diamond compounds are used in sequence, starting with a coarse grade and following with successively finer grades containing lesser micron sized particles. Verson is following the 45-OS-30 with Grade 15-OS-30 and using Grade 6-OS-375 for final finish. In extreme cases, Grade 3-OS-40 is used to obtain a super finish.

Typically, punches and dies are lapped in a lathe rotating at approximately 450-500 r.p.m. The coarser grade of diamond compound is impregnated into a laminated hardwood lapping stick, beveled to 45°, and the beveled end is then applied to the O.D. of the punch and traversed by hand up and down its length. The dies are lapped in the same manner using a round hardwood lapping stick.

Succeeding lapping and polishing operations are performed with a Di-Profiler, a reciprocating hand tool, using successively finer grades of compound to produce a mirror finish which expedites the flow of metal along the length of the punch.

One exception may be noted. In the case of aluminum extrusion, the punches and dies are given a matte finish with a vapor blast after having been given a very fine mirror finish with successive applications of diamond compound to assure the removal of all nicks and scratches so that the matte will be uniform.

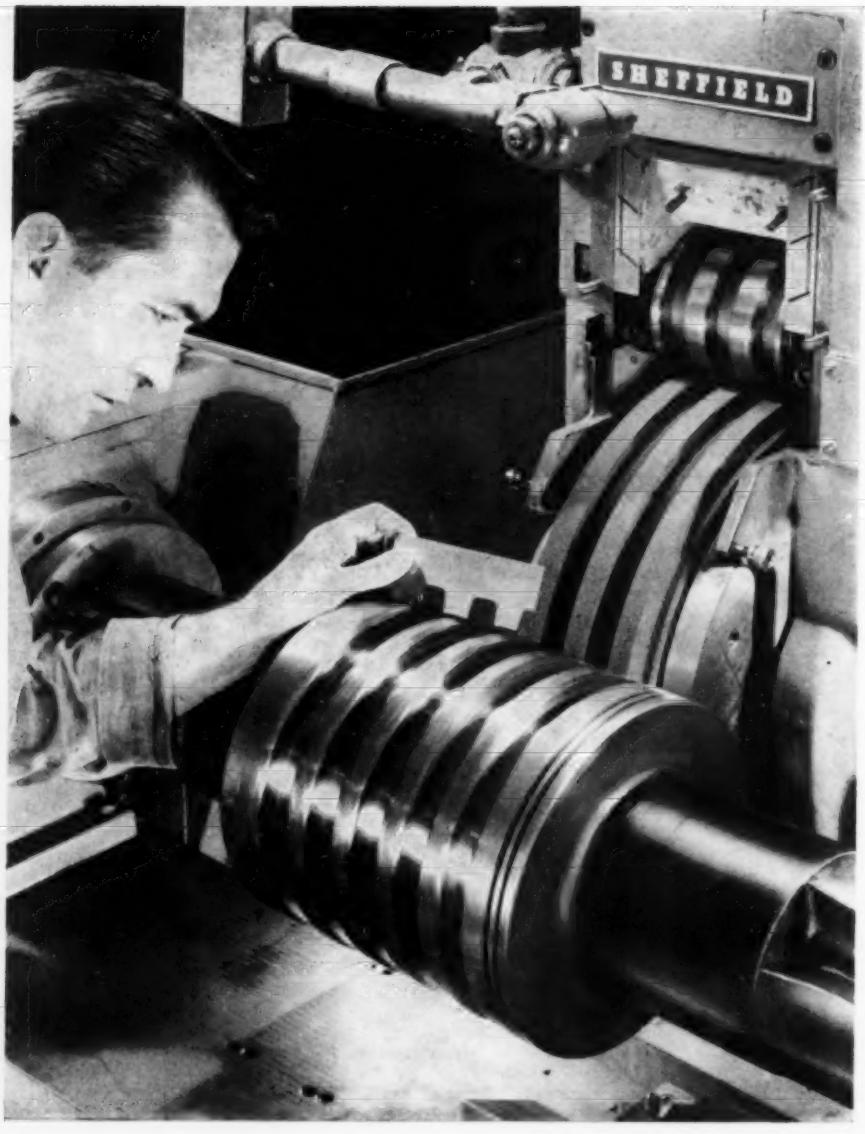
Once a punch has been sized and finished properly, there is little or no wear, and it should have a long service life. However, many punches suffer an initial upset after the first few strokes as the material of the punch compresses under pressure. The resulting bell shape or other distortion may be refinished out with the above procedures. Further refinishing of dies may be carried out from time to time as may seem necessary after inspection of the tool—provided it may be done within the limits of tolerance as to size of the finished part being produced. • • •

Dies are finished using the same compound sequence used for punches. They are also lapped on a lathe at 450 to 500 rpm using a round hardwood stick to lap the I.D.

The 45° angle is applied to the O.D. of the punch and is traversed by hand down and back the length of the punch.

Final polishing operations are generally performed down the length of the punch with a Di-Profiler reciprocating hand machine and a special lap designed for use with the machine.

Eighty Percent Less Time by Form Grind of Large Rolls



Operator is shown here checking with a template the form which has been ground in this roll by Sheffield Crush-true process.

Six hours instead of 45 and 2 hours instead of 50 are the reduction in time which have resulted from form grinding of rolls which may be as large as 72″ long by 14″ in diameter with forms up to 1″ deep.

● The application of crush form grinding for the grinding of annular grooved rolls such as those used in rod and bar mills is a major revolution in roll maintenance.

While the use of crush form grinding to grind smaller work pieces is not new, modifying the method for rolls which may be six feet or more long and which weigh up to a ton and a half, is new. Two distinct advantages of grinding over the old method of turning are achieved.

Grinding is faster. The time required to grind a roll as against the time for turning a comparable roll is substantially reduced.

Forty minutes rather than 3 to 4½ hours to redress 32 grooves in a roll . . . 6 hours to grind instead of 45 hours by present methods for the edging roll for a large bar mill . . . a reduction from 50 hours to less than 2 hours for grinding chilled iron rolls used in rolling sled runners . . . these are time savings that warrant consideration.

Grinding permits the use of harder rolls than can be turned on conventional roll lathes. This in turn results in longer "pass" or groove life and better quality rolls. Longer intervals between pass or groove change mean less downtime on the mill.

The development of this application has been done on a Sheffield Model 180 Multi-Form Grinder modified to handle finish train mill rolls up to 60″ long and 12″ O.D., grinding passes up to ½″ deep.

Sheffield is designing and building a Model 190 Crushtrue Multi-Form Grinder to grind rolls up to six feet long x 14″ in diameter weighing up to 3,000 pounds utilizing a 30″ dia. x 10″ wide wheel.

Larger rolls with deeper passes than on intermediate and finishing rolls are used for roughing, but the need for redressing is not as great for this type of roll as it is for finishing and intermediate rolls. The latter types are typically 9″ to 12″ in diameter, with the length depending on the type of product being rolled and the remainder of the equipment.

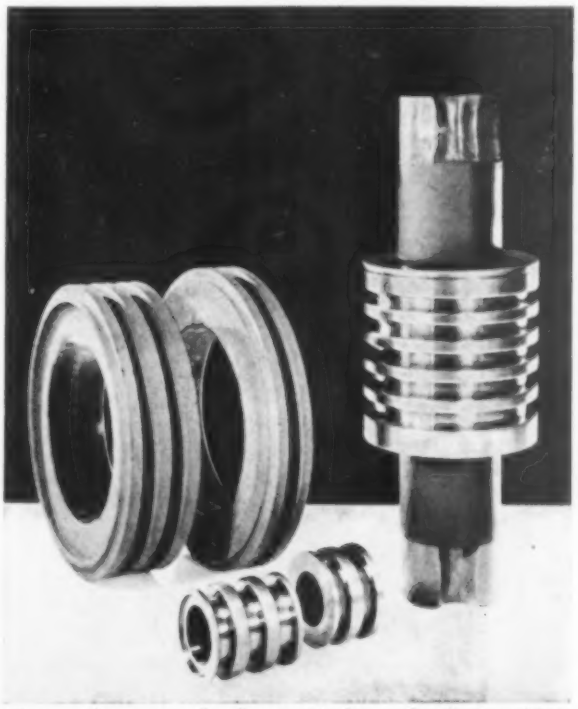
Finishing rolls must have the most precise passes and must be changed most frequently. Customarily, with rolls in a hardness range suitable for turning—50-52 Rc (70-72 Shore), or at most 55-57 Rc (75 Shore)—the mill is shut down every eight hours to change pass lines. Actual mill tests of ground rolls with 60-62 Rc (82-84 Shore) indicates pass life has doubled to 16 hours.

Similarly pass life of ground intermediate rolls is twice as long as turned ones, increasing to 32 hours from 16.

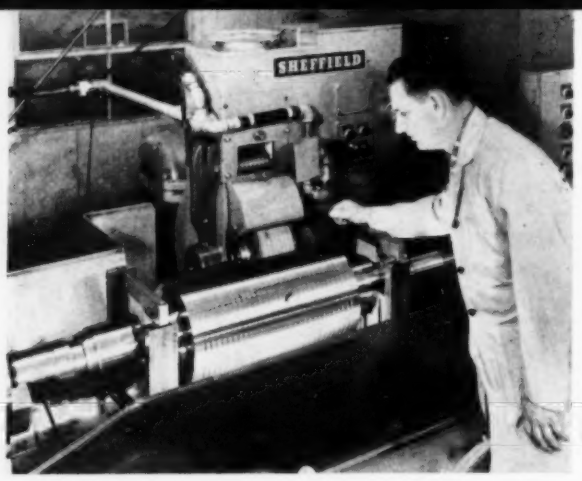
Roughing rolls, which are larger, with deeper and wider passes, do not have nearly as great a requirement for redressing as others. Under conditions as above, pass changes on these rolls are made only every 36 hours. Crush form grinding of roughing rolls is also under investigation.

The form grinding operation on rod and bar mill rolls might perhaps best be described as a cylindrical plunge grind.

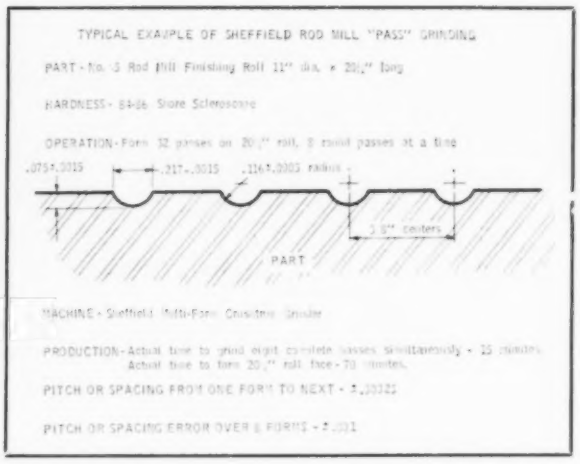
A hardened steel or carbide Crushtrue® roll ground to the contour desired in the work roll is mounted in a Crushtrue® device located directly above the grinding wheel. The Crushtrue roll is automatically fed into the slowly rotating abrasive



Shown above are the form grinding wheels, crushing rolls and ground roll for bar mill. The passes in this roll were ground to a depth of .6875″ or .003″ in widths from ⅝ to ⅞″ in six hours. Time required to turn 45 hours.



Sheffield Multi-Form Grinding Machine for forming and redressing rod mill rolls by the Crushtrue® process.

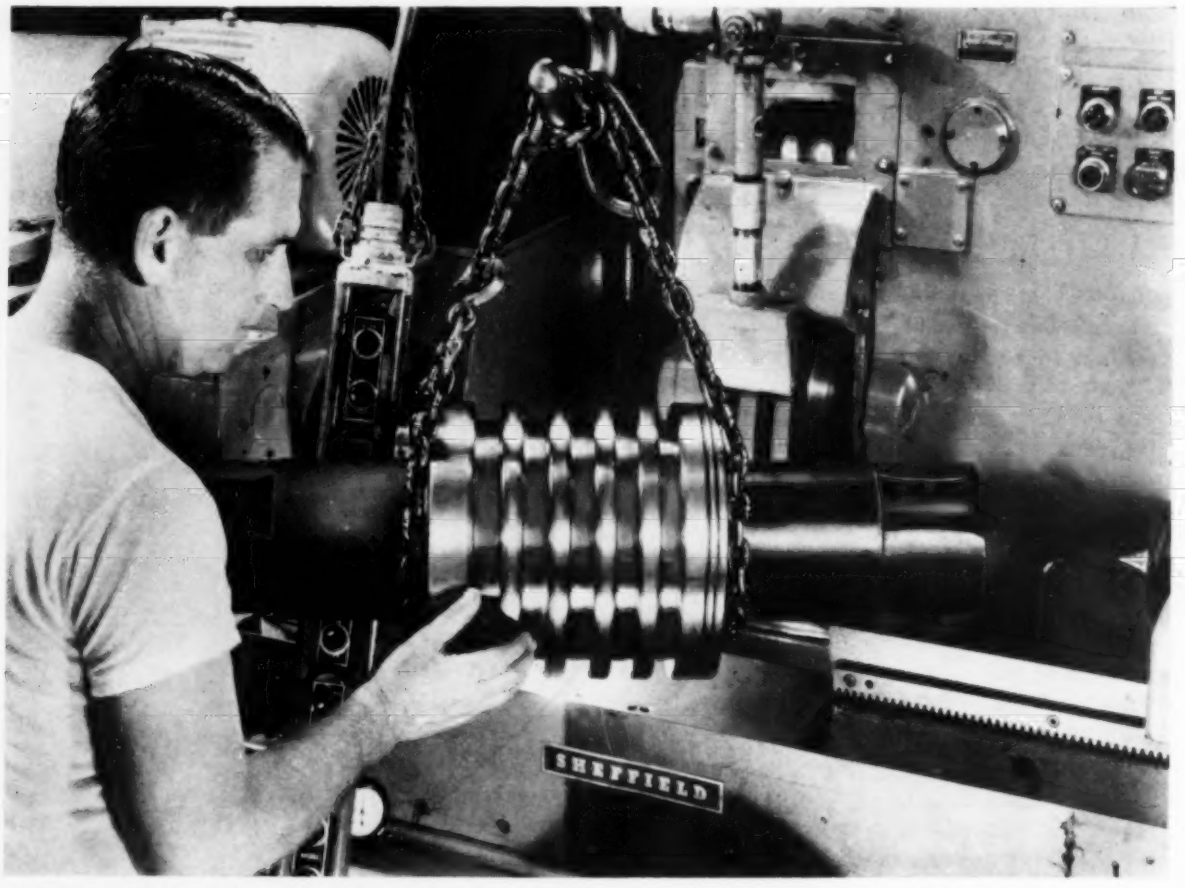

TYPICAL EXAMPLE OF SHEFFIELD ROD MILL "PASS" GRINDING
PART - No. 3 Rod Mill Finishing Roll 11" dia. x 20½" long
HARDNESS - 84-86 Shore Scleroscope
OPERATION - Form 32 passes on 20½" roll, 2 rigid passes at a time
.075±.0015
.217-.3015
.1167.0005 radius
3 6" centers
PART
MACHINE - Sheffield Multi-Form Crushtrue Grinder
PRODUCTION - Actual time to grind eight complete passes simultaneously - 25 minutes
Actual time to form 20½" roll face - 70 minutes
PITCH OR SPACING FROM ONE FORM TO NEXT - ±.00125
PITCH OR SPACING ERROR OVER 6 FORMS - ±.001

grinding wheel until the wheel takes the reverse form of the roll. Then the Crushtrue roll is automatically retracted, and the mill roll is plunge ground with the wheel rotating at grinding speed.

At scheduled intervals, the grinding wheel is automatically Crushtrue dressed to maintain required form. Speed of grinding wheel during dressing operation is 200 to 300 SPM.

Grinding wheels for this application range from 20" to 30" in diameter, with the thickness depending on the machine and the workpiece. As was noted above, wheels up to 10" wide can be used. The wheels used are vitrified aluminum oxide, 80-100 grit, medium grade, relatively open structure. A high grade grinding oil is recommended as coolant for both crush forming of the wheel and grinding of the rolls.

The future of this application is promising. Within ten years, according to the roll shop general foreman of a major steel producer, crush grinding will be standard practice for all finishing and intermediate rolls in hardness range of 60-62 Rc. For this hardness, grinding is the only practicable method and there are no technical barriers to keep an operator from handling more than one grinding machine. • • •



Five passes in this edging roll were Crushtrue ground from the solid in six hours with only two indexes of the part.

SAM SAFETY says:

Automatic Sizing and Finishing of Rubber Rolls

By DARRELL WARD
Engineering Editor

● One of the more important single components in an electric typewriter is the rubber face power roll which, upon engagement, drives each key into its stroke. This part is made up of a thick, medium hard rubber sleeve, adhesive bonded over an aluminum cylinder. Since rubber varies in texture and dimension as it comes from a vendor, precision size is not obtainable in a vendor part ready to use. I B M mounts this sleeve on the cylinder and then grinds it to proper size and surface finish for proper functioning. In addition to close sizing and good finishing, the parts must be uniform.

Engineers at the Lexington, Ky., plant of I B M solved this grinding problem by making special adaptations to a Cincinnati H-10 cylindrical grinder. Attachments were built to provide hopper fed, automatic loading with automatic ejection and hopper receiving of parts which are finished. The operator, under normal conditions, merely loads the feeding hopper and removes parts from the receiving hopper as required.

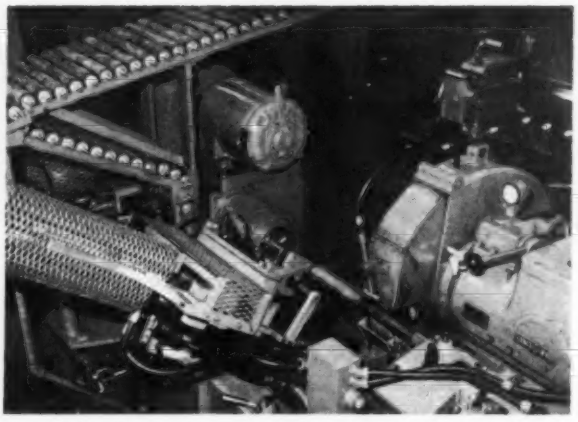
Limit switches and solenoids control air cylinders, making the entire operation fully automatic, cycle after cycle, until the machine is shut off. Parts are ram ejected from the feed hopper track into a spring finger clamping carriage. This carriage, driven by air cylinder, moves down to bring parts between centers of the grinder. The tailstock center, also controlled by air cylinder, chucks the part on journal centers and the part is ready for machining as the feed carriage returns for the next part.

The table travels forward to present the part to the wheel. A rough cut of 0.030" is made in the one pass. A finish cut of 0.005" is made on the return. Finished diameter of the power roll is 1.504" ± 0.005".

The workpiece turns at 650 rpm. Feed rate varies according to surface finish produced. The rubber sleeves vary somewhat in rough size and in composition. Larger and more gummy material requires slower feed.

When the table returns to normal position, the part is automatically ejected by retraction of the tailstock center and is dropped into the receiving hopper below where it is later removed by the operator.

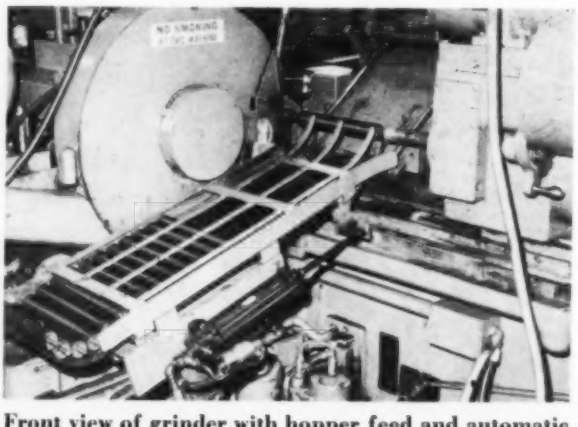
The wheel used is 24" x 2" x 12" vitrified silicon carbide, 30 grit, H grade, 10 structure, which is dressed once a day after approximately 1000 parts are ground. The wheel is stepped with a relief of approximately 0.010" on the leading edge to begin the rough cut. Dressing is done with a single diamond.



Receiving hopper travels with grinding head, catches ejected parts as they drop from centers.

It was found that if more than about 1000 parts are run before dressing, the surface finish of the rubber becomes loaded. The extent of wheel loading varies with different lots of vendor parts, therefore this operation depends as much on the skill of the operator as upon the mechanical factors and specifications of the job. Visual inspection is made as parts are run, principally to determine porosity of material, possible blisters, scoring from the wheel, or cut marks left by the rubber manufacturer.

For this kind of operation, human judgment is the deciding factor on quality of surface as long as dimensional tolerances are held. • • •



Front view of grinder with hopper feed and automatic loading attachments.

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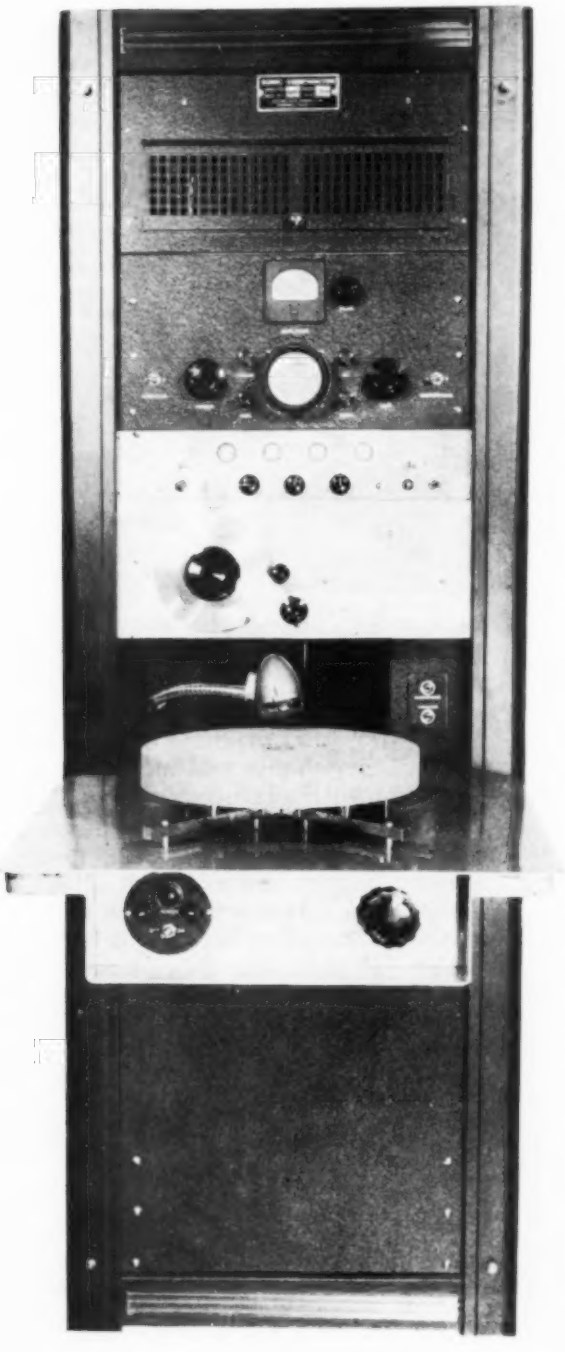
Wheel Grading by Frequency

Special to **GRINDING** and **FINISHING**

● The requirements for uniformity between abrasive wheels of a specific type are becoming increasingly rigid, due to the marked advance in the design of automatic grinding machines and the increased emphasis upon grinding to extreme accuracy. The demand for finer finishes, accurate reproducibility and reduced tolerances demands that the abrasive wheel user seek dependably uniform abrasive products.



For a particular grinding application any one of a number of similar abrasive wheels may produce the desired end result through proper machine set up. Adjustment of the grinding parameters may be caused to compensate for certain differences between abrasive wheels.

However, in grinding applications involving large numbers of identical parts, in which wheels periodically are consumed and replaced, the trial and error time for periodic readjustment after a wheel change materially may be reduced if it were possible to select an identical replacement wheel.

In a series of supposedly identical grinding wheels, the natural frequency of vibration of each wheel is a sensitive measure of even minor differences. The probability is high that identical grinding results would obtain by selecting the replacement wheel, from the shipment of supposedly identical wheels, on the basis of natural frequency of vibration. Each wheel received in a shipment may be marked with its individual natural frequency of vibration, the wheels arranged in order of their natural frequencies and periodic replacements based on this order, to minimize machine adjustment after each replacement.

The following table was prepared to illustrate the sensitivity of the natural frequency of vibration to variations in grit size, percent bond and molding pressure in vitrified abrasive wheels. While the data was compiled from a series of 8" x ½" x 1½" silicon carbide wheels with a glassy-type vitrified bond, similar results are obtained with other sizes, abrasives and vitrified bonds. The natural frequency of vibration was measured by the resonance method, as with the Model 105 SONIC COMPARATOR, manufactured by Saturn Electronics Co., 8237 Witkop Avenue, Niagara Falls, N.Y., provided with digital frequency readout to an accuracy of 0.1 percent.

In a series of supposedly identical wheels, the variables of grit size, grain type, percent bond and molding pressure are amenable to rigid control. However, the abrasive character of a grinding wheel equally is sensitive to the degree of development of the bond, a function of the precise thermal history of each individual wheel during firing. Unavoidable differences in precise thermal history, due to kiln temperature gradients or the position of the individual wheel in the kiln load, similarly are reflected in the natural frequency of vibration of each wheel.

The sensitivity of the sonic test indicates that it merits further study and understanding by the users of abrasive wheels, as a refined method for natural frequency to grinding ability in a series of supposedly identical abrasive wheels. • • •

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Model	Tub Capacity	Tub Size, Inside		
		Length	Width	Height
VT-70	¾ gallon	7″	4¾″	6″
VT-71	1 cu. ft.	12″	12″	12″
VT-72	2½ cu. ft.	15″	16″	18½″
VT-75	5 cu. ft.	31″	17″	19½″
VT-77	7 cu. ft.	31″	17″	22½″
VT-712	12 cu. ft.	35″	25″	30⅜″
VT-717	17 cu. ft.	47″	25″	30⅜″

New VT-72 Vibrasheen being unloaded into optional hoist-pan. Note convenient height of controls.

ANOTHER REPORT FROM THE ALMCO ALBUM OF NEW PRODUCTS

IT'S A FACT! With the seven (7) new ALMCO Vibratory Machines, you can expect finishing time cycles 10 to 100 times faster than with standard horizontal barrel finishing equipment. It's a significant production break-through, made possible by creating constant vibratory motion to activate the entire mass of media and parts in the finishing container, as compared to only 20% activation with conventional barrel finishing methods.

The uniform vibratory motion of the media in recessed areas, blind holes and small I.D. dimensions make it possible to obtain optimum results on a multitude of applicable parts with intricate configurations that can not be completely processed in standard horizontal barrel machines.

What's more, this amazing metal finishing machine only requires 50% of the floor space that is taken up by any other machine of this type with a similar capacity. Time and motion is at the absolute minimum with all convenient operating conditions.

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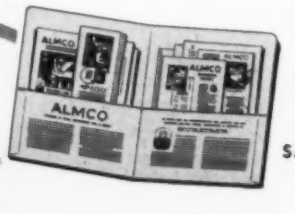

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Literature

1. Barrel Finishing Media. Lorco Jetforms, new barrel finishing media, are described in a new bulletin, No. 900. Jetforms are a natural mineral medium, principally silica and alumina. The text is augmented by photos of the new media, plus a table of 16 screen mesh sizes. Case histories of results are also included. Bulletin 900, Lord Chemical Corp., 2068 South Queen Street, York, Pennsylvania.

2. Toolroom Grinding Wheels. A new, illustrated catalog bulletin describing Simonds toolroom grinding wheels features SA Borolon, single crystal type, friable aluminum oxide abrasive for tool and cutter grinding and for horizontal surface grinding. Grain and grade recommendations are included, arranged according to standard tool steel classifications. Form ESA-272. Simonds Abrasive Company, Tacony and Fraley Streets, Philadelphia 37, Pennsylvania.

3. Electronic Adjustment Device: Polishing and Buffing. Descriptive literature on the Packer Machine Company's AdjustaMatic, a packaged electronic device which automatically compensates for buff or wheel wear in high production rate finishing operations, is now available. The flier is a two-color sheet which describes the full operation of the device and illustrates wheel or buff compensating motion. The device, it is claimed, reduces wheel wear, achieves more uniform finishes, and reduces compound costs. Packer Machine Company, 456 Center St., Meriden, Conn.

4. Lapping Manual. An eight-page, two-color manual and catalog covers lapping techniques, laps, lapping tools and machines. Lapping techniques are detailed, giving information on fast stock removal beneficial to those who lap on production basis and to those whose lapping is occasional. American Lap Company, 20180 Sherwood, Detroit 34, Michigan.

5. Automating Vibration Finishing. A 5-page catalog on automated vibration finishing explains Vibro-Finishing, which is said to be a completely new approach to vibration, and Vibro-Mation, a means of automating the process, including automatic handling of both finished parts and media. The equipment is applicable to continuous-flow as well as to batch-type operations. Conveyor Corporation, Finishing Division, 19815 East Nine Mile Road, St. Clair Shores, Michigan.

6. Grinding Wheels for the Welding Trade. A new booklet entitled "Grinding Wheels for the Welding Trade" has been published by the Norton Company. Each type of wheel used in this field is described as to uses and properties. Photos and tables amplify the text. A net price supplement is included. Form No. 1724. Norton Company, Advertising Department, Worcester 6, Massachusetts.

(See Number 2)

(See Number 4)

(See Number 6)

7. Diamond Research. A beautifully-illustrated 24-page brochure, now available, describes the operation, the objectives and the accomplishments of the Diamond Research Laboratory, Johannesburg, South Africa. In operation for about thirteen years, the laboratory is said to have produced many developments. A list of publications of the laboratory, available on request as long as the supply lasts, is included. Diamond Research Laboratory, Crown Mines, P.O. Box 104, Johannesburg, South Africa.

8. Internal Grinding Wheels. A new booklet, PG-354, describes the features of Cincinnati internal grinding wheels, includes a table of suggested gradings for internal grinding operations and several helpful rules of thumb to be kept in mind. Cincinnati Milling Products Division, Cincinnati Milling Machine Company, Cincinnati 9, Ohio.

9. Diamond Tools. A 12-page bulletin describes the complete line of Nesen Diamond tools, including a tabulation of diamond sizes, tool numbers and shanks to be used on various wheels, sketches of standard shanks, and complete descriptions and prices of multi-diamond and impregnated diamond tools. Nesen Diamond Tool Corporation, 111 Lake Avenue, Tuckahoe, N.Y.

10. Hydraulic Surface Grinding Machine. A four-page two-color folder describes the features and the advantages of the Norton 8" x 24" Type S-3 hydraulic surface grinding machine. The machine grinds at 125 feet per minute, which is claimed to decrease grinding time and assure better surfaces by dissipating heat in thicker chips. Complete specifications and a list of equipment included in the machine price are shown. Form 1982-IP. Norton Company, Worcester 6, Mass.

11. Distance Meter. A two-page illustrated catalog sheet is now available, describing the Type DM-100 distance meter, a portable and lightweight precision instrument for such applications as measuring distance in precision grinding processes, measuring tool wear, and measurements

(See Number 8)

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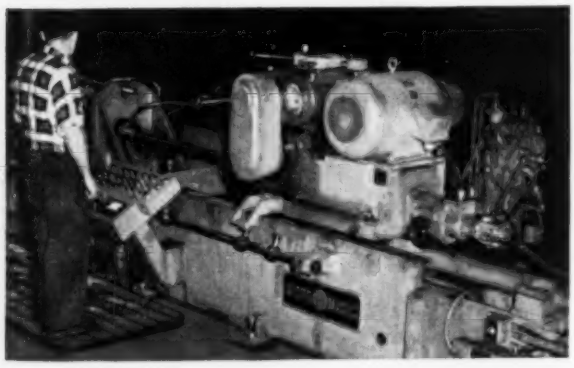
WHY MICROHONING* OF HARDENED LINERS cuts production time two-thirds

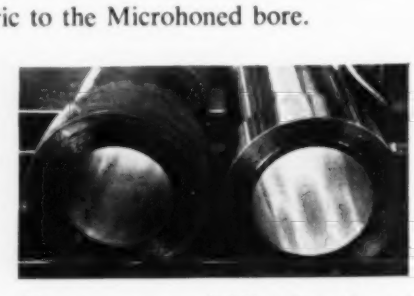
One of the largest steel corporations utilizes Microhoning's rapid stock-removal in the processing of oil well slush pump liners. Bore diameters ranging from 4.50″ to 7.75″ and up to 28″ long are lined with a special alloy steel hardened to 64-66 Rockwell "C". Over one cubic inch of stock per minute is removed from bores of these liners to reduce required production time by two-thirds.



This heavy-duty Hydrohoner has a 4-foot hydraulic head stroke, an 8-speed transmission, a special heavy-duty feed mechanism and automatic stonewear compensation.

One heavy-duty horizontal Hydrohoner has eliminated the use of bore grinding (two grinders), and replaced two old vertical honing machines. Requiring only one operator, the Hydrohoner does the complete bore machining operation in one-third the previous time. Also, during the automatic rough-Microhoning cycle, the operator is free for an average of 20 minutes to work on an adjacent machine, where the liner O.D. is machined concentric to the Microhoned bore.

Two Microhoning operations are performed (rough and finish) to provide final bore roundness and straightness within .0005″ and surface finish of 6-8 microinches (rms). An extremely hard surface having geometric accuracy and controlled finish lasts longer, provides better performance – that's why Microhoning is specified for processing these oil well slush pump liners.



Shown are rough-Microhoned and finish-Microhoned bores. Following each Microhoning operation every bore is given a close inspection under the revealing probe of a fluorescent light to insure a flawless surface.

See facing page for details on how Microhoning of pump liner bores secured production time savings.

**Registered U.S. Pat. Off.*

PRECISION PRODUCTION THROUGH ECONOMY MICRO MATIC

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

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FREE LITERATURE *continued*

where continuous recording and remote indication are required. The sheet, Bulletin WK-DM-100, provides a description of the instrument's operating principle and typical applications. Bulletin WK-DM-100, Wayne Kerr Corporation, 1633 Race Street, Philadelphia 3, Pennsylvania.

12. Abrasive Tech. The April issue of this Behr-Manning magazine features a suggested guide to streamline plant economy in the use of coated abrasives, together with a discussion of the new "Vizi-Disc." Behr-Manning Co., Troy, New York.

13. Disc Grinding. Another publication of the Grinding Wheel Institute is "Disc Grinding, Safe Rules and Methods," which describes the various methods of mountings, the mounting procedure, storage and handling, speeds, and protective devices. Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio.

14. Flexible Shaft Machines and Accessories. A series of publications, Catalogs No. C-500, C-501, C-502, and Bulletins 250 and 257, describes the Strand line of flexible shaft machines and accessories. Included are both floor-stand and suspended machines, mounted wheels, brushes, and related items. N. A. Strand Flexible Shaft, Inc., 601 South Washtenaw Ave., Chicago 12, Illinois.

15. Form-Tool Grinding Machine. Four-page, two-color folder, punched for standard three-ring binder, describes the Model 1215 high precision circular form-tool grinding manufactured by Jones-Shipman, and marketed in the U.S. by Micromatic Hone Corp. Explanatory text and close-up photos supplement the tabulations of dimensions and the listing of features and optional equipment. Bulletin 235G. Micromatic Hone Corp., 8100 Schoolcraft Avenue, Detroit 38, Michigan.

(See Number 15)

16. Do-It-Yourself Castings for Toolmakers' Tools. A four-page illustrated folder describes a line of do-it-yourself castings for machinists' and toolmakers' tools. All pieces are ⅛″ oversize to allow for finishing. Lambert Products Co., 70 Pine Avenue, Haverhill, Mass.

17. Form Grinder. A new 12-page brochure in two colors gives complete information on the Sheffield Model 181 multiform

grinder and the Crushtrue® wheel dressing process which is the machine's distinguishing feature. Full-view and close-up photos illustrates the various advantages of the machine. Typical applications are described and illustrated. The Sheffield Corporation, Dayton 1, Ohio.

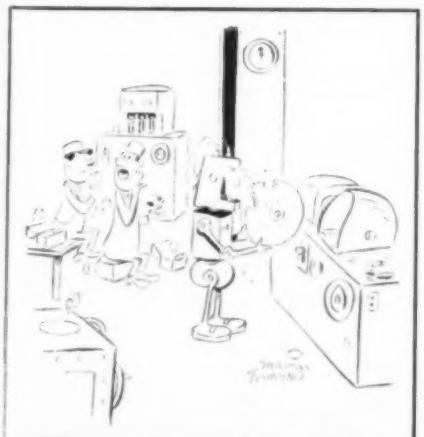
18. Rust Preventive Compounds. Information on four types of rust preventive compounds, identified by the name Anarust, is contained in a new bulletin. Two of the four are additives used principally in wet blasting abrasive slurry and two are compounds used after the cleaning and finishing process. Physical properties and applications are shown, and results of laboratory tests are illustrated. Bulletin 1001. Techline Division, Wheelabrator Corporation, 2068 South Queen St., York, Pennsylvania.

19. American Standards Price List and Index. The 1960 Price List and Index of American Standards, published by the American Standards Association, lists nearly 1,900 American Standards that have been approved to date. The fields covered include automotive, chemical, civil engineering and construction, drawings, symbols, abbreviations, electrical engineering, metallurgy, materials handling, mechanical engineering, mining, nuclear, photography and motion pictures, paper, petroleum, rubber, textile, wood, safety, gas appliances and some consumer goods. American Standards Association, Dept. PR 151, 10 East 40th Street, New York 16, N.Y.

20. Hole Location Gages. Hole locating and concentricity gages are featured in a new 8-page Con-Chek gages bulletin. Special Mayes Tool gages using Con-Chek gages to check multiple holes in parts are also shown. Mayes Tool Co., 26514 W. Seven Mile Road, Detroit 40, Michigan.

21. Separating Equipment. A four-page bulletin describes the Techline Division's line of magnetic and mechanical separating equipment for sorting parts from media and for grading various sizes of barrel finishing media. Capacities, specifications, and operating features of four models—a mechanical separator, a magnetic separator, and two types of manual separators—are covered in the bulletin. Bulletin 402. Techline Division, Wheelabrator Corporation, 2068 South Queen Street, York, Pennsylvania.

22. Guide to Micrometer Reading. To meet many requests from apprentices, students, and tradesmen in metalworking industries, the J. T. Slocomb Co. has just published a one-page, two-color, fully illus-

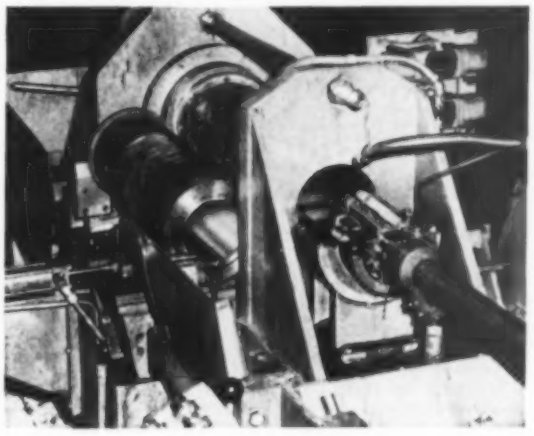


"The way he eats, he must have a cast iron stomach."

HOW MICROHONING OF HARDENED LINERS cuts production time two-thirds

Microhoning eliminates bore grinding (two grinders), replaces two old vertical honing machines with one horizontal Hydrohoner, and performs all bore machining on this one Hydrohoner in one-third of the previous processing time. Here's how these unusual production results are obtained on oil well slush pump liners.

Two Microhoning operations (rough and finish) are performed on the bores of these hardened (64-66 Rockwell "C") liners. Bore diameters range from 4.50" to 7.75" and lengths are up to 28". The rough Microhoning removes approximately .090" of stock at an average clip of .0045" per minute and generates a 20 microinch (rms) finish.



Fixturing includes hydraulic end clamping to handle liners from 14" to 28" long. Adjustable hydraulic loader handles varying diameters. Heavy-duty Micromold tooling allows the use of more abrasive for faster stock removal. One tool handles a range of bore diameters.

A new stonefeed assembly, capable of exerting a five-ton thrust, permits this stock-removal performance. When the Microhoning tool enters the bore, the abrasives are instantly expanded against the bore surface. As contact is made, a sensing device de-energizes the rapid feed and a pre-set regular feed rate controls further expansion. At the end of the automatically timed Microhoning cycle, the tool is instantly collapsed and withdraws from the bore.

Changeover from rough to finish Microhoning requires only the replacing of abrasives with finer-grit sticks and resetting of timer to shorter cycle—less than 90 seconds is needed for changeover. Finish Microhoning time is about two minutes, roundness and straightness are held within .0005" variation throughout the length of bore, and surface finish of 6-8 microinches (rms) is generated.

MMT-PE

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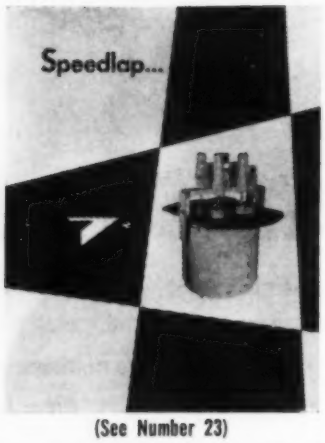
FREE LITERATURE *continued*

trated sheet, "How To Read a Micrometer." The sheet describes the principle of operation, shows how to read a conventional mike from thousandths to tenthousandths of an inch. Instructions for reading a "Speedmike," a direct-reading Slocomb exclusive, are also given. J. T. Slocomb Co., 68 Matson Hill Road, South Glastonbury, Connecticut.

23. Lapping for Stock Removal. Four-page, two-color folder sets forth the advantages of "Speedlapping" for rapid stock removal. According to the manufacturer, there is no need for clamping or magnetic chucking; only a few grit sizes need be stocked; and the opposite side from the working face of the piece-part need not be regular. Abrading Systems Company, 8020 North Monticello Avenue, Skokie, Illinois.



(See Number 23)

24. Methods of Mechanical Deburring. A recent four-page fully-illustrated folder details four methods of mechanical deburring. The literature describes and diagrams the methods, and gives numerous examples of their application. Equipment for these deburring processes includes Wheelabrator airless blast machines; Techline barrel finishing; Lorco vibratory machines, and Liquamatte wet blast equipment. Mechanical Deburring News, Wheelabrator Corp., 1169 S. Byrkit Street, Mishawaka, Indiana.

25. Plastic-Faced Surface Plates. Specifications and advantages of fine-grained granite surface plates faced with epoxy plastic material are fully described in Bulletin 1004. Eight plates are available in standard sizes ranging from 1440 to 6912 square inches. Advantages include abrasive resistance, dimensional stability, freedom from warpage, and ease of repair. Bulletin 1004. Ren Plastics, Inc., Dept. RP-56, 5422 S. Cedar Road, Lansing 9, Michigan.

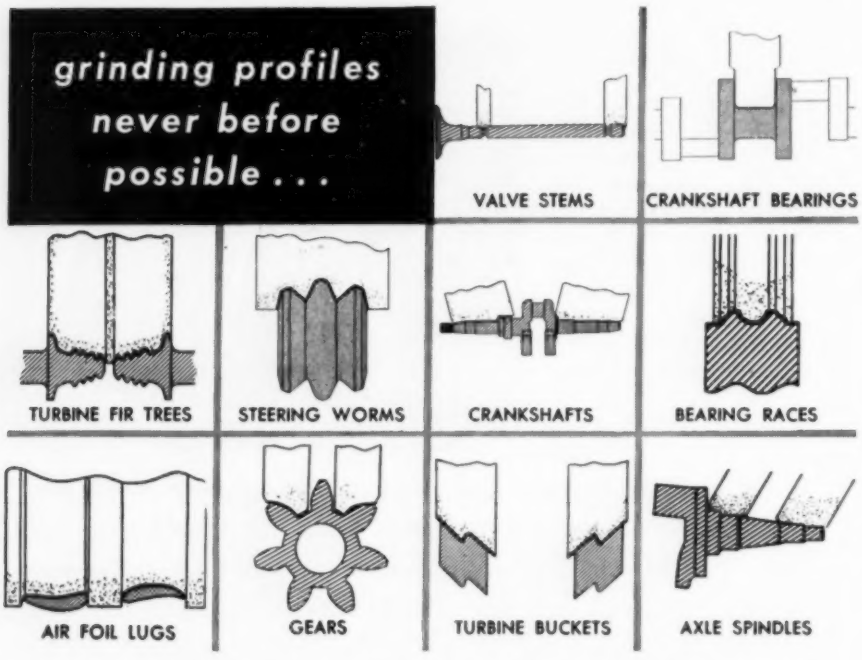
26. Dust Collectors. Data sheet punched for three-hole binder lists advantages, specifications, and accessories for the Cincinnati Dust-Master D-5 dust collector. The unit is portable, can be supplied on a 4-wheel dolly at extra cost. Other dust and mist collectors of special sizes and capacities are also offered. Cincinnati Fan & Ventilator Co., 3548 Montgomery Road, Cincinnati 7, Ohio.

27. Abrasive Finishing of Zinc. New technical data sheet covering the abrasive finishing of die cast and rolled zinc. This information sheet gives such data as polishing wheel speeds, type of buff and recommended abrasive compound. Hand and automatic set-ups using both bar and liquid compounds are covered. The Lea Manufacturing Company, 16 Cherry Ave., Waterbury 20, Conn.

28. Direct Reading Internal Diameter Gage and Setting Fixture. A six-page gatefold data sheet in two colors describes the recently-developed Sunnen precision hole gage and setting fixture, which is claimed to require no masters, rings, or setting blocks. Setting and operating instructions are given, and photos of typical applications are shown. Bulletin SSC-B1. Sunnen Service Corporation, 7900 Manchester, St. Louis 17, Missouri.

29. Abrasive Belt, Disc Finishing Machine. A four-page illustrated bulletin describes a new Delta combination finishing machine, with a standard 4" abrasive belt and a 12" abrasive disc. Action photos and graphic text show the specific operations the machine can perform. The piece also contains complete specifications and catalog listings. Bulletin AD-1224, Delta Power Division, Rockwell Manufacturing Company, 469 North Lexington Avenue, Pittsburgh 8, Pa.

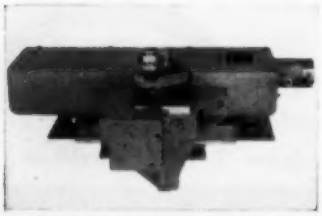
grinding profiles never before possible . . .



now routinely ground to "tenth tolerance" accuracy

HOGLUND CONTOUR WHEEL DRESSERS

Hoglund Contour Wheel Dressers incorporate an ingenious inclined plane mechanism which enables dressing of almost any profile to accuracies of .0001". The dressers feature interchangeable master contour templates. Diamonds are optically pre-set, eliminating dresser adjustment or down-time for replacements. Hoglund Dressers can be hand or automatically controlled. They can be installed on grinders already in service or as original equipment



120 Different Types . . .

Adaptable to all grinders including surface, cylindrical, centerless, spline and gear, double spindle, microcentric.

PROFITABLE CONTOUR GRINDING . . . For economical solution to tough contour grinding jobs, send your part prints for recommendation and quotation. Catalog and literature yours for the asking.

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"So that's what happened to that so-called 'barrel-finishing' expert!"

30. Oscillating Chip Breaker and Cup Wheel Grinder. Two large photos across the inside spread dominate this four-page folder about Hammond's new Model CME-15 grinder. This model comes in three styles—conventional, manual spark control, or automatic spark control. Major specifications, standard equipment and extra equipment are listed. Temp. Bulletin 248-T. Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo, Mich.

31. Grinding and Cutting. A technical journal on grinding is Tyrolit's "Grinding and Cutting," which has been published for some time in German, and has been recently made available in English as well. Recent issues of the journal have featured articles on carbide grinding and on abrasive cut-off applications. Current editions sent free on request from engineers, plant managers, buyers, and similar personnel interested in grinding. Requests for back issues—some seven or eight have appeared in English—will be filled as long as copies are available. Tyrolit Company, Inc., 49 West 37th Street, New York 18, N.Y.

32. Vibratory Finishing. A colorful and comprehensive three-color catalog describes, illustrates, and provides technical information on Almco's seven vibratory machines. The brochure also shows a wide variety of "before and after" views of parts finished with Almco machines and methods. Almco Models VT-70, VT-71, VT-72, VT-75, VT-77, VT-717, and VT-712 are featured. These models provide tub capacity from ¾ gallon to 17 cu. ft. Almco, Queen Products Division, King-Seeley Corporation, Albert Lea, Minnesota.

(See Number 32)

100. Sam Safety Posters. A single copy of the current Sam Safety poster, or of any one of the ten which have preceded it, 8½" x 11", on 100# enamel, is available on request. Circle No. 100 on the Reader's Service Card. Nos 1-7 (September, 1959-March, 1960) are available immediately; Nos. 8, 9, 10, and 11. (April, May and June, 1960) will be available about July 15.

For large quantities, circle No. 100 on the Reader's Service Card, note on the bottom of the card the numbers and the months of publication of the posters you want, and enclose the card with a remittance according to the following schedule:

Up to 9 posters	.15 each
10-99 posters	.12 each
100 or more	.10 each

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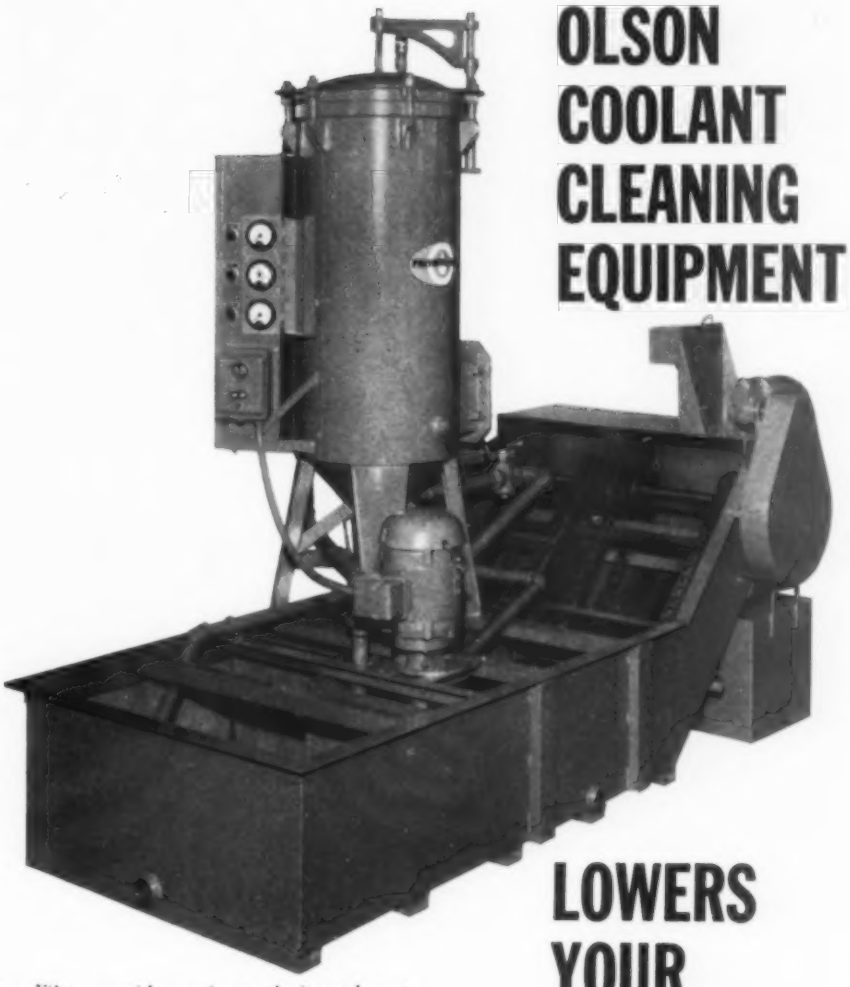

OLSON COOLANT CLEANING EQUIPMENT

LOWERS YOUR COST PER PART

Olson Filters provide maximum clarity at lowest operating costs. Can be furnished for central systems or as individual units, automatic or manually operated.

By removing even minute particles (½ micron) of metal and abrasive contaminants, Olson Filters automatically deliver a continuous supply of visually clean coolant. This is especially important in precision grinding and finishing operations to produce low micro-inch finishes at a reasonable cost.

Olson-clean coolant prevents excessive loading of grinding wheels, eliminates too-frequent dressing, and guarantees greatly increased wheel life. More important, Olson will custom engineer a filtration system to meet *your* specific needs—automatic or manually operated, central system or for individual machines or operations. For complete information, mail the coupon today.

OLSON FILTRATION ENGINEERS *Division of The American Laundry Machinery Company, Cincinnati 12, Ohio*

OL-14G

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Solve the problem of on-the-job precision grinding wheel balancing,

QUICKLY, ECONOMICALLY!

Stewart-Warner's new Model 2390 Portable Balancer is specifically designed for in-place balancing. New balancer is high on sensitivity and surprisingly low in price!

Shop-designed for precision on-the-job balancing:
1. Strobe light and meters mounted in same portable head for easy one-man operation. 2. Removable lightweight electronic unit for easier balancing in confined spaces. 3. Electro-magnetic pickup can be simply placed on machine part, freeing operator's hands.
1
2
3
Symbol of
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Excellence

Finer finishes and closer tolerances demand precision grinding wheel balance.

Wheels last longer with longer runs before re-dressing. Machine down-time is kept at a minimum by balancing on grinder spindle under actual operating conditions.

Strobe light and meter quickly disclose amount and angle of unbalance. Where precision balance is not required, the 2390 still cuts balance time to ⅓ that of static method.

The Stewart-Warner 2390 Portable Balancer offers the lowest cost, compact, precision, electronic balancer made! Ask for a demonstration. Write for free catalogs.

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Dept. BP-70, 1850 Diversey Parkway, Chicago 14, Ill.

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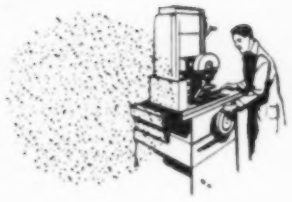


Equipment and Materials

New Gisholt Superfinisher Features Flexibility

Gisholt Machine Company has recently introduced a new Masterline Model 51B general purpose Superfinisher, designed for flexibility.

The simple bed is closed on three sides but is open on the front for easy access to the lubricating pump. Mounted on the bed are a headstock, a tailstock and a vertical platen.

Both the tailstock and the vertical platen are mounted in "T" slots for easy positioning along the bed. The platen is furnished with a self-contained reciprocating unit on which can be mounted either one or two stone-carrying quills.

Work is held between centers in a chuck, a collet or a fixture, or supported on rollers. To this basic machine can be added a second vertical platen to permit Superfinishing as many as four different areas simultaneously.

For work that may require positioning of the upper head for ease of loading and for I.D. work, a means for moving the stone quill four inches longitudinally can be provided. This, along with all other machine functions, is incorporated in the completely automatic machining cycle.

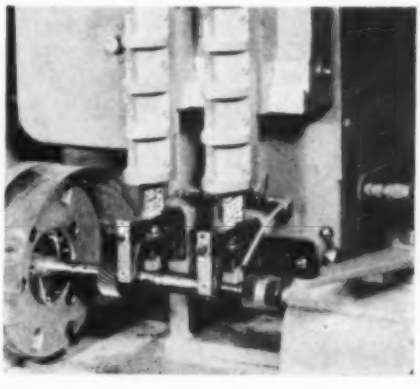
With this building block principle, the customer can start with a machine having a single stone-carrying quill, and later add one, two, or three additional quills for simultaneous finishing of multiple surfaces.

This is possible because the vertical platen is mounted in tee slots for positioning along the bed. The head on each platen will accommodate two quills, and the machine table is large enough to carry two vertical platens.

Increase in capacity from one to four quills requires no machine modifications and can be accomplished in the user's plant.

The close-up of the work area shows an arrangement for simultaneous finishing of two surfaces of a transmission sun gear shaft, an automotive part.

The part is held between centers and rotated by a face plate mounted on the headstock spindle. A second quill has been added to the reciprocating head mounted on the vertical platen.



When the cycle start button is energized, the part is rotated and the two quills descend, bringing the stones into contact with the work. At the same time the quills impart a reciprocating movement to the stones.

The cycle is completely automatic, with predetermined stone pressure rate of reciprocation and length of cycle.

This type of part can be completed from a surface of 25 RMS to a finish of 3 to 5 RMS in 12 seconds, according to the manufacturer.

Gisholt Machine Company, 1245 East Washington Avenue, Madison 10, Wisconsin.

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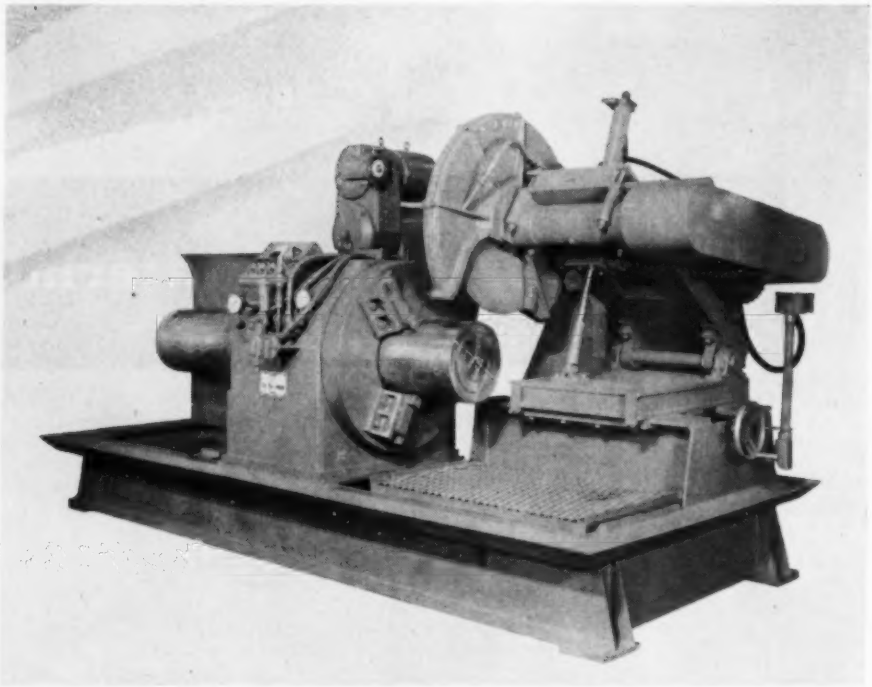
Huge New Abrasive Saw Cuts Alloys in Rough Castings, Rounds, Squares



A new Rotator Abrasive Saw, designed for sawing hard-to-cut alloys in solids, shapes and tubing form, has been developed by Ty-Sa-Man Machine Company.

Based on the principle of rotating the material as it is being cut, the saw keeps a cooler surface at the point of blade contact, resulting in a cooler cut and longer blade life. It is the only rotator-type saw with a chuck which will hold both rough forgings and squares, as well as conventional rounds.

Designed especially for manufacturers who produce large rounds or squares in various grades of steel, the new rotator saw reduces cutting time to a minimum, and in actual plant tests has made cuts up to 16 to 20 square inches per minute on hard alloys.

Designed to carry up to a 34" diameter wet abrasive wheel, the machine features a 60 HP main drive motor with a heavy-duty Timken bearing arbor running in oil. The wheel is fed into the material by means of a hydraulic ram at a variable speed selected by the operator. The sawing assembly is mounted on an adjustable base providing horizontal adjustment of about 18", which allows the operator to cut slices from the end of the material.

The chuck can handle up to a 14" maximum outside diameter round, up to 10 feet long. The holding device consists of a double-faced chuck supported by 29" outside diameter Timken tapered roller bearings completely sealed in a one-piece steel housing. The material is placed through the eye and is securely held by a three- or four-jaw chuck combination. This design enables the machine to rotate irregular sizes or shapes such as rough forgings, rounds, squares, etc. The material does not have to be machined or straightened in order for it to be rotated underneath the saw blade.

Completely self-contained and portable, the saw has its own integral tank and re-circulation pump.

Ty-Sa-Man Machine Company, 1016 White Avenue, Knoxville, Tennessee.

Use postpaid card. Circle No. 41

Mounted Wheel Line Expanded

Dayton Safety mounted wheels and points are a specially developed line of abrasive products designed for most portable hand grinder applications. This new product line, available in standard A, B and W shapes and sizes, is now being offered by the Simonds Worden White Company, Dayton, Ohio. All Dayton Safety mounted wheels and points are furnished in four different bonds, and in a variety of grain sizes from coarse to very fine.

The new Fibrasive wheels and points, manufactured of abrasive grains, cotton fibers, and rubber resins, are recommended for finish grinding of plastic molds, dies and precision parts.

Rubber bonded wheels and points are recommended for high finish requirements in die and mold polishing and finish grinding of stainless steel welds.

Resinoid bonded wheels and points are recommended for standard grinding of stainless steel welds and snagging work in ferrous and non-ferrous casting.

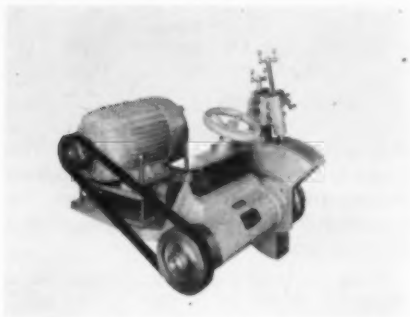
Vitrified bonded wheels and points are recommended for general all purpose use where open structure free cutting wheels are required.

Simonds Worden White Company, 1101 Negley Place, Dayton 7, Ohio.

Use postpaid card. Circle No. 42

Thread Grinder Designed for Engine Lathe Cross Slide Mount

A special purpose thread grinder, developed by the U. S. Electrical Tool Company, features spindle adjustment for various lead angles. The motor is adjustable on its base with the angle of the spindle.



The unit, designed for engine lathe cross slide mounting for thread grinding, is available in various horsepower. It also features a vertical feed adjustment, and can be supplied with a built-in wheel dresser. The U. S. Electrical Tool Company, 3640 Llewellyn St., Cincinnati 23, Ohio.

Use postpaid card. Circle No. 43

Small Air Grinder Has Adjustable Operating Speed

Small wheel pneumatic grinders adjustable to any operating speed between 16,000 and 25,000 rpm have been developed by Thomas C. Wilson, Inc. The feature permits the grinder to be operated at the optimum tool speed for the material and the abrasive wheel.

Weight is 1¾ pounds. Model 921-35, with ⅜ x 24 threaded spindle, is 6⅜" long. Model 921-45, available with 1/4, 3/16, or 1/8" collet is 5¾" long. Series 921 grinders are also available in single-speed models.

Thomas C. Wilson, Inc., Long Island, New York.

Use postpaid card. Circle No. 44

New Mechamatic Machine for ID and OD Deburring

A new type of Mechamatic machine has been developed for the purpose of deburring and finishing cylindrical (though not necessarily symmetrical) parts which require work on the inside and outside dimensions.

The photo shows a typical application. The piecepart is a diesel engine cylinder sleeve. The Mechamatic process removes all burrs, generates a uniform radius on the periphery of each exhaust

port, and maintains a specified microinch surface measurement. One man services six stations with a production of approximately 300 per hour at 100% efficiency.

Unique features of the equipment include a vibrating abrasive media tank, combined with a part spindle oscillated radially at a high rate of speed.

Fixturing is air-actuated, can be readily changed for other pieceparts.

Mecha-Finish Corporation, Sturgis, Michigan.

Use postpaid card. Circle No. 45

Electronic Compensating Device for Buff, Wheel Wear

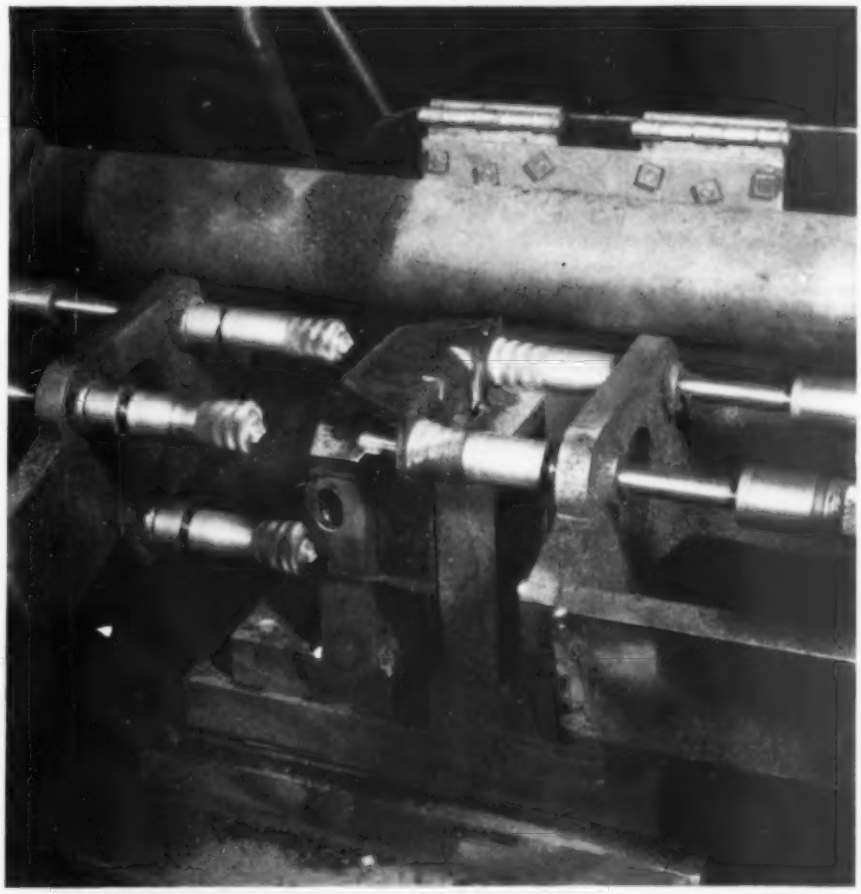
A packaged electronic adjustment device, automatically compensating for buff or wheel wear in high production finishing operations has been introduced by The Packer Machine Co.

Called the Adjusta-Matic, the unit is included with all new Packer-Matic machines. It can easily be installed on equipment currently in the field. The unit is controlled through ampere flow on a special control panel where limits of operation are set on simple, easy-to-read dials.

The Packer Machine Co., 456 Center Street, Meriden, Connecticut.

Use postpaid card. Circle No. 46

FACING ... *another problem*



SPOT FACING operation at Monarch Rubber Company, Hartville, Ohio. These Osborn End Brushes—in combination with drills—are horizontally mounted in two drill clusters. They clean surplus rubber from bolt holes and face the area around bolt holes on both sides of this rubber-bonded-to-steel motor mount. Rate: 750 pieces per hour.

SOLVED *with Osborn power brushing*

Facing off surplus rubber inside and around the bolt holes of this shock-absorbing, rubber-bonded-to-steel motor mount used to be a production bottleneck for this manufacturer.

Now an efficient combination setup of drills and Osborn Power Brushes replaces a former slow, costly drill press operation. Production is up to 6,000 pieces per 8-hour shift with brush life running 18,000 to 20,000 parts.

Your own troublesome metal finishing problems of every description—deburring, cleaning, polishing, precision blending—can be eliminated with advanced Osborn power brushing methods. An **O**sborn **B**rushing **A**nalysis—made in your plant now at no cost or obligation—is the first step toward smoother, less costly production. Write for details. *The Osborn Manufacturing Company, Dept. G-5, Cleveland 14, Ohio.*

Osborn Brushes

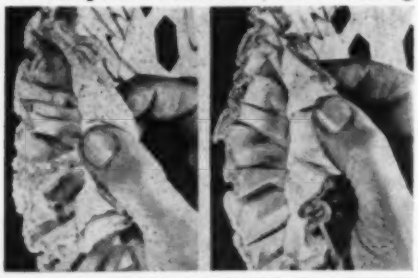
OSBORN

Metal Finishing Machines . . . and Finishing Methods
Power, Paint and Maintenance Brushes
Foundry Production Machinery
Use postpaid card. Circle No. 235

Binderized Buffs Announced

Binderizing is a process by which the buffing wheel cloth is impregnated with the same binder used in buffing compounds. The buff is provided with an internal lubricant that permeates the cloth, providing even wear through the life of the buff.

Six major advantages are claimed by Hanson-Van Winkle-Munning Company, the manufacturer, for their Binderized Ruff-L-Buffs: longer life, better compound adherence, faster cutting action, extended compound life, shorter break-in time, and cooler operation.



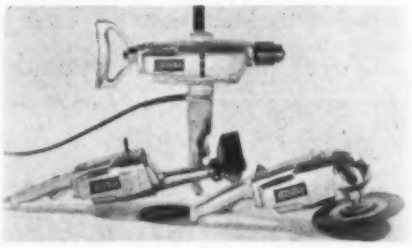
Hanson-Van Winkle-Munning Company, Church Street, Matawan, New Jersey.

Use postpaid card. Circle No. 47

Portable Power Tools

A completely new line of 16 Stanley portable power tools includes three heavy-duty disc sanders in 7" and 9" sizes; a 7" polisher; two portable grinders in 5" and 6" sizes; and ten heavy-duty drills.

According to the manufacturer, these tools are up to 35% lighter in weight, up to 100% more powerful, have been designed for easier operation.



Felt seals to lock out abrasive dust, exclusive "window" brushholders to reveal brush wear without removing brushes from holders, and one screw to hold commutator covers are among the other features.

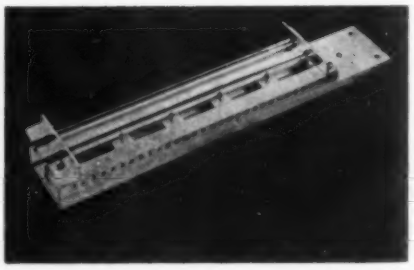
Stanley Electric Tools, division of The Stanley Works, 195 Lake Street, New Britain, Connecticut.

Use postpaid card. Circle No. 48

Abrasive Belt Slitter Can Reduce Belt Inventory

Econaway Manufacturing Company has added an abrasive belt slitter to their line of abrasive belt splicing equipment. The slitter will cut any belts up to 14" wide into any narrower width desired.

By doing so, it is claimed to reduce the number of belt widths carried in stock.



The unit comes complete, is easy to operate, has no transmission nor motors involved. According to the maker, any employe can slit a thousand belts a day on the machine.

Tearing belts leaves ragged, crooked edges which produce poor grinding. Belts cut on the slitter are said to have straight, true edges, to produce much better work.

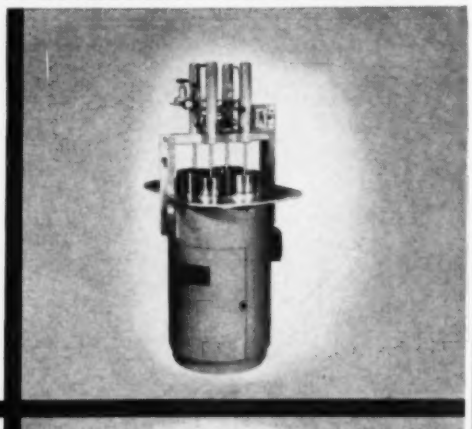
Econaway Manufacturing Company, 722 North Main Street, Bellevue, Michigan.

Use postpaid card. Circle No. 49

THE 18" SPEEDLAP

Exceptionally well suited for smaller parts (1/16" to 6¾" O.D.) such as silicon semi-conductors, valve discs, spacer washers and hearing aid components including parts as thin as .003". Has 143 square inches of working area available with capability of removing 1.43 cubic inches of material* per hour.

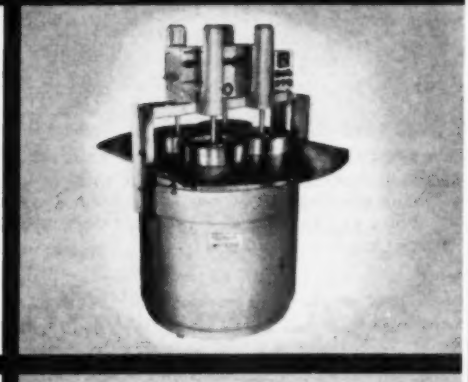
* FREE MACHINING METAL



THE 32" SPEEDLAP

Excellent for handling intermediate size parts (½" to 12" O.D.) like compressor plates, pump rings, die castings and seal plates; also parts to .010" minimum thickness. Provides 450 square inches of useable working area with a stock* removal rate of 6.75 cubic inches per hour.

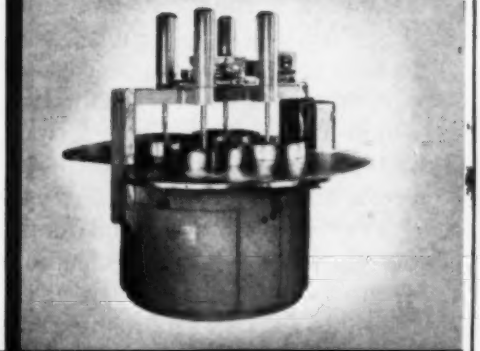
* FREE MACHINING METAL



THE 48" SPEEDLAP

Accommodates large parts (½" to 18" O.D.) or an extremely high volume of small parts. Applications include pump housings, small cylinder heads, valve plates, meat chopper discs, etc., and myriad small parts in quantity. Working area covers 1050 square inches. Unit is capable of removing 26.25 cubic inches of material* per hour.

* FREE MACHINING METAL



SPEEDLAP

removes stock faster than most grinders—accurate to within millionths of an inch. Materials range from the ceramics and silicons through the steels (including stainless) as well as castings and die castings . . . Larger size machines on special order.

Use postpaid card. Circle No. 236

Ask for free cost and production estimates based on samples or prints of your parts. Job lapping service also available.

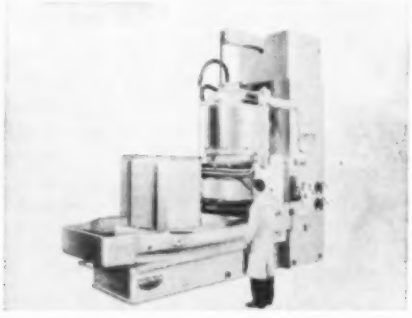
PHONE ORchard 6-1500 or write:
SPEEDLAP CORPORATION
8022 N. Monticello Avenue
Skokie, Illinois

Giant Rotary Surface Grinder Has Quick-Tilt Spindle

Extra-large pieceparts can be rough and finish ground in a single operation on a new Quick-Tilt vertical rotary surface grinder with a 60 to 72 in magnetic chuck. The machine, manufactured by Mattison Machine Works, has enough mass to apply 125 hp through the spindle, thus increasing productivity by approximately 50% over conventional methods, it is claimed.

A unique innovation for this class of machine is Mattison's selector-switch-actuated power spindle tilting. For the first time, pieceparts can be machined with a hogging cut to within a few thousandths of final size, grinding with the leading edge of the wheel to increase grain penetration—then finish ground in the same setup. The massive one-piece column and rigid head permit utilization of maximum horsepower without deflection or vibration.

Antifriction table bearings are a new feature of the 60 in. Mattison rotary. A total of 850 precision ball bearings are spaced in four rows between carriage way and table way. They reduce power requirements for machining extra-heavy pieceparts.



Downfeed is continuous, from .005" to .165" per minute. It is disengaged instantly, by predetermined stop, when desired size is reached. With continuous downfeed, it is possible to split the last increment of a ratchet-type feed to meet close tolerance limits.

Long-range predetermined stops, .001" to .240", increase efficiency on high stock removal jobs. Operators can set maximum feed and grind to size in one interrupted cut without miking.

The new Model 60 features block-type styling and is available with 60 to 72 in. magnetic chucks. The 72 in. chuck can be furnished with a dead ring to 84 in. Grinding wheels of 32, 36, and 42 in. are offered.

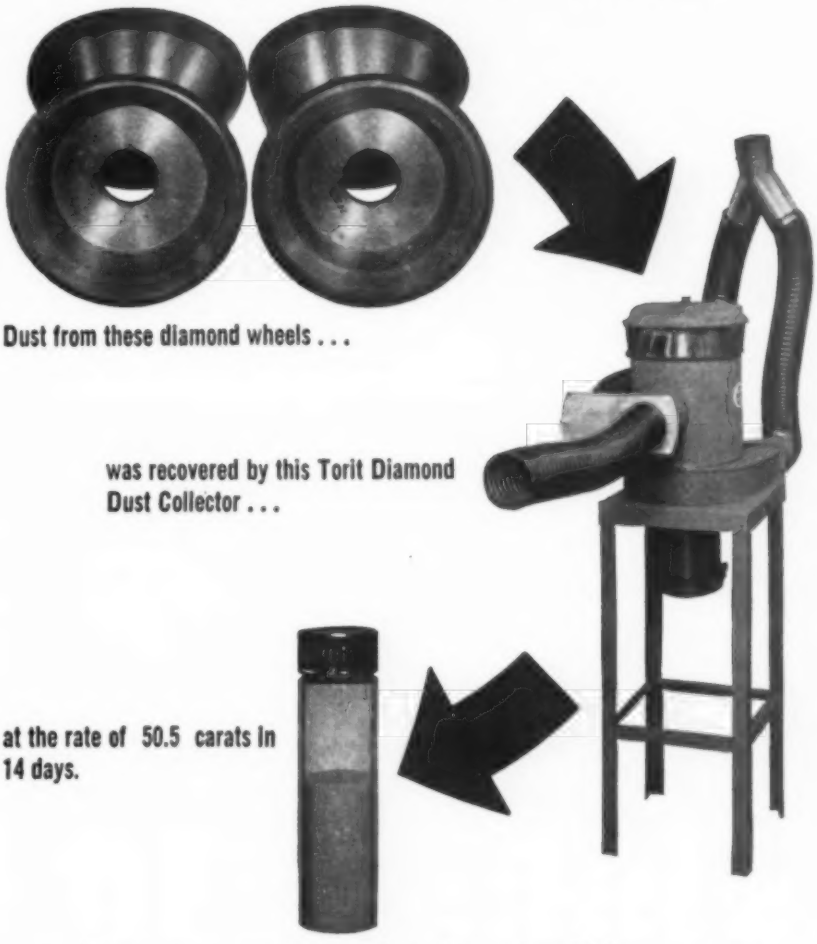
Mattison Machine Works, 545 Blackhawk Park Ave., Rockford, Ill.

Use postpaid card. Circle No. 50

New Device Simplifies Jig and Fixture Design

The new Adjusto-Quick Jig-Lok, recently developed by L-W Chuck Company, simplifies jig and fixture design and eliminates special locking details. Simple turning of the control automatically adjusts the holding pressure from

NEW TORIT DIAMOND DUST COLLECTOR SAVES YOU UP TO 30% OF CARAT USAGE; COSTS ONLY $178.50!



Dust from these diamond wheels . . .

was recovered by this Torit Diamond Dust Collector . . .

at the rate of 50.5 carats in 14 days.

exclusive new centrifugal design simplifies recovery, serves all diamond grinding operations

Actually pays for itself in days. In an on-the-job test of this new TORIT equipment, the initial investment was returned in just 21 operating days. The test was conducted by a leading automobile manufacturer under regular operating conditions. Recovery averaged 30% of the carats originally contained in the diamond grinding wheels. You actually get a cash return of $1.00 for every $10.00 invested in diamond grinding wheels.

For all diamond grinding operations. This new TORIT Collector provides the same outstanding performance in all types of grinding operations—mist, wick or dry. Its design and operational simplicity also mean virtually maintenance-free service. Its tough construction assures long, long life.

Installs anywhere. TORIT'S new Diamond Dust Collector can be used alone or in conjunction with central exhaust systems or unit dust collectors. It weighs only 65 lbs. and requires only 14" x 22" floor space. Its centrifugal separating action uses no filters or sloppy, inflammable oil baths. Service is quickly and conveniently performed by simply unscrewing the unit's top for removal and emptying of the clear plastic container.

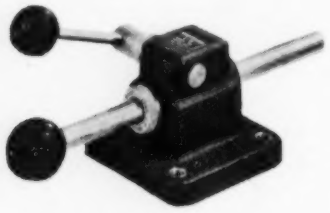
FREE details and full specifications on request. Here's your chance to really save on your diamond usage. Write today for full information on this important new diamond grinding development. Dept. 510

TORIT MANUFACTURING COMPANY 1133 Rankin Street

St. Paul 16, Minnesota

Use postpaid card. Circle No. 237

1 up to 1500 pounds. Easy hand pressure locks and securely holds rigid or non-rigid work in position without distortion. There are no screw threads to wear and no clamping and holding tools are required.



The end of the hardened and micro-ground locking bar has been left soft one inch from the end for easy machining to add to fixtures.

The Jig-Lok is being offered in two models, with base dimensions 4" x 4" or 5" x 5".

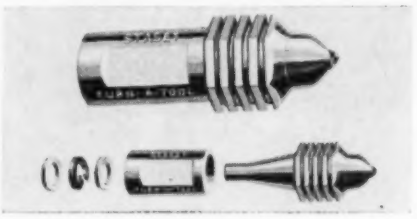
L-W Chuck Company, 80 So. St. Clair Street, Toledo 4, Ohio.

Use postpaid card. Circle No. 51

Unique Design Permits Rotation Of Entire Diamond Tool

An entirely new concept in diamond tool design called "Turn-A-Tool" has just been announced by the Staset Company. Turn-A-Tool provides an easy and practical way to keep the diamond sharp by turning of the tool from 0° to 360° as required by the operator.

The principal feature of patented Turn-A-Tool is its radical design which permits turning of the entire tool within a fixed shank. This special feature



means absence of wear at the bearing surface and constant trouble-free tension.

Unlike other manual "diamond turning devices", Staset's design utilizes the entire tool and can be applied to all diamond tool styles and a complete range of diamond weights in single point, multiple point, or cluster diamond tools.

Staset Company, Inc., 66 Franklin Ave., West Orange, N.J.

Use postpaid card. Circle No. 52

Portable Cabinet Type Dust Collector Features Double Filter

A double filter action is a notable feature of the Dustmaster model D-5, Cincinnati Fan and Ventilator Co.

This portable unit also features no exposed moving parts and a spark-proof cast aluminum fan. It operates on a permanently lubricated continuous-duty ½ hp motor.

A front access door facilitates the removal of the dust pan and filters.

Cincinnati Fan and Ventilator Co., 3512 Montgomery Road, Cincinnati 7, Ohio.

Use postpaid card. Circle No. 53

Now! see the NEW!
K. O. LEE GRINDERS
. . . the World's Most Versatile Grinding Machines!

The Model BA960 Universal Grinder is a result of over 30 years of experience in the manufacture of precision grinding machines, attachments and fine tools.

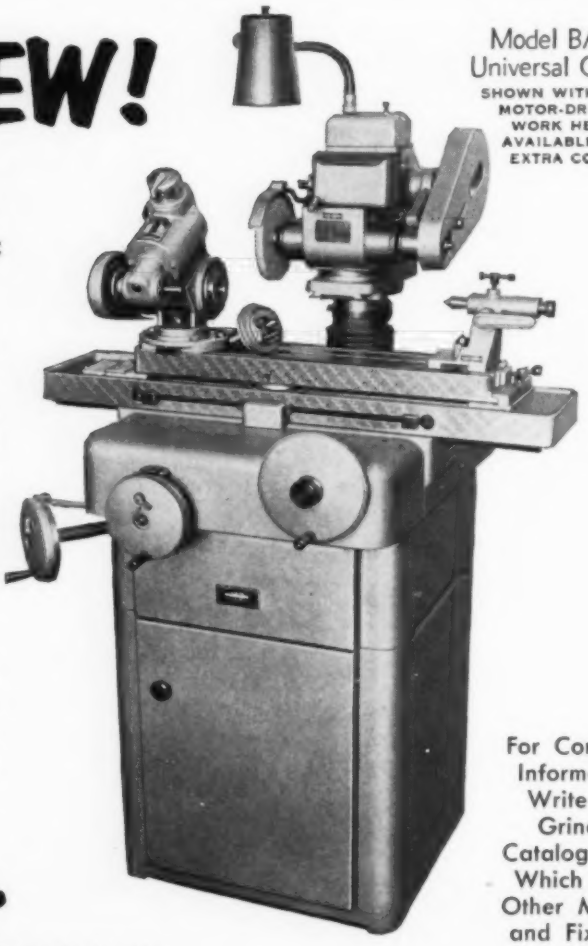
This machine is the biggest value in the industrial market. A truly universal machine, spindle speeds from 3450 to 20,700 RPM with standard equipment included, capable of handling all types of O.D., I.D. grinding operations demanded by the average shop.

K. O. Lee grinders have proven themselves year after year in the metal working industry. They have outsold all other grinding machines in their field.

We invite you to visit our Distributors. Compare this machine for quality, engineering, workmanship, sturdy construction and modern appearance against any machine on the market. See for yourself how much more you get for how much less you pay.

We believe that you will be pleasantly surprised.

K. O. Lee Co.
ABERDEEN, SOUTH DAKOTA



Model BA960 Universal Grinder
SHOWN WITH B943 MOTOR-DRIVEN WORK HEAD AVAILABLE AT EXTRA COST

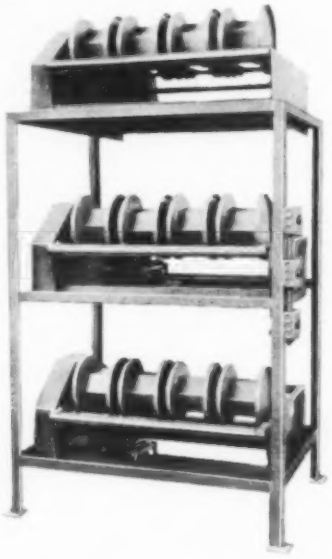
For Complete Information Write for Grinder Catalog TG-1 Which Lists Other Models and Fixtures

Use postpaid card. Circle No. 238

Low-Cost Bench-Type Finishing Machine

A compact, portable finishing machine, the Model RA4 Rollabrader, has been introduced by Rampe for small-parts work.

The machine processes four barrels at a time, has 20 to 46 rpm variable speed drive. Barrels are each two-quart capacity, with vinyl plastic lining.



Barrels are readily removed from the drive rollers, permitting extra barrels to be loaded while others are in process. The speed changer is hand-wheel operated.

Rampe Manufacturing Co., 14915 Woodworth Avenue, Cleveland 10, Ohio.

Use postpaid card. Circle No. 54

Self-Flushing Coolant Filter

A new self-flushing coolant filter called the Dundick "Imperial" employs a special filtering aid compound which is added to the coolant. This additive forms an open porous "cake" on the filtering elements, constructed of finely woven wire mesh screen.

This "cake" allows purified coolant to pass through freely, traps sludge and other suspended foreign matter down to one micron.

Daily back-flushing of the filter and recharging with filter aid each morning is claimed to keep the filtering action at its peak, reduces the need for periodic shut-downs for cleaning.

Only standard pipe and fittings are required for installation.

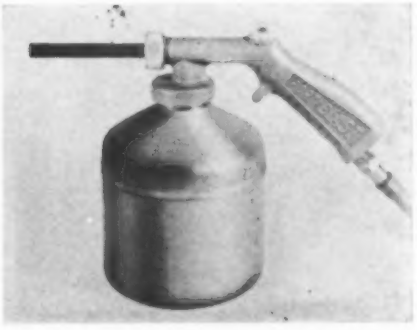
Dundick Tool Works, 3410 West 31st Street, Chicago 23, Illinois.

Use postpaid card. Circle No. 55

Portable Sand Blast Gun; Blasting Booth

The "Port-A-Blast" is a portable sand blast gun which can be operated on air pressures ranging from 60 to 150 psi, and which handles silica sand, shot, aluminum oxide, nut shells, and similar abrasives in sizes ranging from 60 to 1000 grit size.

The unit is equipped with a 1 quart



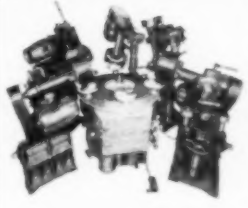
container for abrasives, but can be fed directly from a hopper for production work.

Also available is a 24" x 24" blasting booth, in which the gun can be used for production blasting.

Price of the gun is $27.50; of the booth, $98.00.

Lindberg Products Co., P. O. Box 908, Lakeport, California.

Use postpaid card. Circle No. 56



Hammond Automatic Deburring Machines will increase production, assure a uniform finish, reduce operator fatigue and save floor space.

Send sample parts for complete engineering report.

Hammond Machinery Builders INC.

1651 DOUGLAS AVE. KALAMAZOO, MICH.

Use postpaid card. Circle No. 239

"Just between you and me, they've got it all over the other ones we've tried!"

While there *are* other excellent brands, experienced operators consistently rate Jewel Brand Abrasive Belts best for grinding, smoothing and polishing. Worth trying! Order thru your Industrial Distributor today.

JEWEL BRAND

COATED ABRASIVES

Belts • Rolls • Sheets • Discs • Specialties

ABRASIVE PRODUCTS, INC.

South Braintree 85, Massachusetts

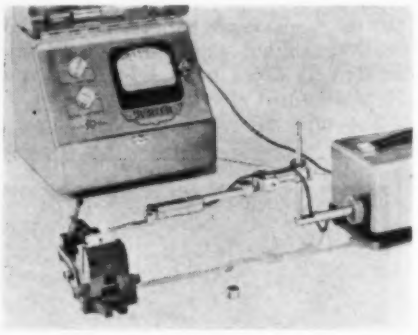
Use postpaid card. Circle No. 240

NEW EQUIPMENT *continued*

Chisel Point Adapter Measures Sharpness of Tool Cutting Edges

A new adapter for the Surfindicator (unit for measuring surface finish) has a chisel point which permits surface measurements of cutting edges, knife edges, and components with very small outside diameters.

Designated model BL-130, the adapter has a sapphire stylus with a chisel



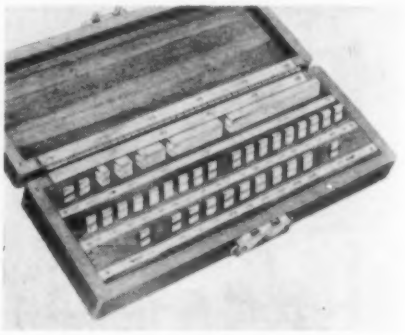
point 1/16" wide and a radius of 0.0005". It will read the arithmetical average of the displacement of the sapphire. Maximum force exerted by the stylus is two grams. Radius of skid is 0.12". Overall dimensions are 2¾" x ⅝" x ⅞".

Brush Instruments, Division of Clevite Corporation, 37th and Perkins, Cleveland 14, Ohio.

Use postpaid card. Circle No. 57

"Compact" Gage Block Set

Webber Gage Company has developed a 36-block gage block set, which is said to produce a great number of essential combinations and to substitute for a standard set of 92 blocks in many smaller shops.



These blocks are made to an accuracy of +.000004" —.000002", closer than the specifications of the U. S. Bureau of Standards for Grade "A" blocks.

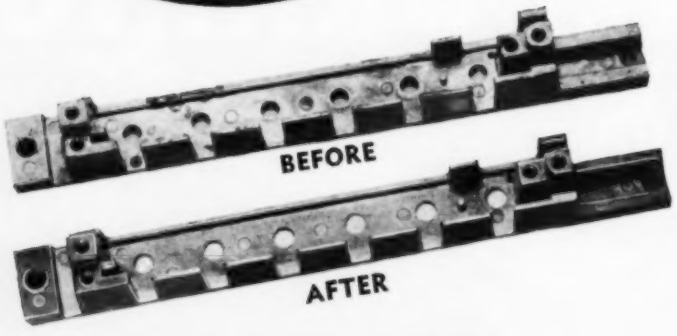
The set is priced at $157.50.

Webber Gage Company, 12900 Triskett Road, Cleveland 11, Ohio.

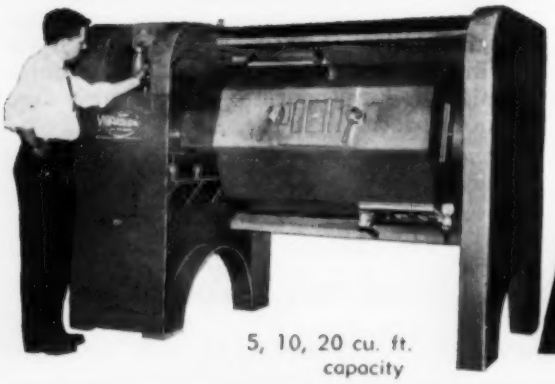
Use postpaid card. Circle No. 58

ELLIOTT VIBRASLIDE FINISHER

FASTER ACTION, BETTER RESULTS, REDUCED COSTS in vibratory finishing



Vibraslide Finisher removed ejector pin flash from thousands of these precision components of a new electronic communications instrument in minutes. Work could not be handled in conventional tumbling.



5, 10, 20 cu. ft. capacity

Vibraslide Finishers are *thoroughly proven, highly flexible* (capable of more varied applications) in precision vibratory finishing. Unique vibration-with-rotation action drastically reduces time cycles . . . eliminates costly hand operations . . . handles more parts . . . substantially lowers all finishing costs.

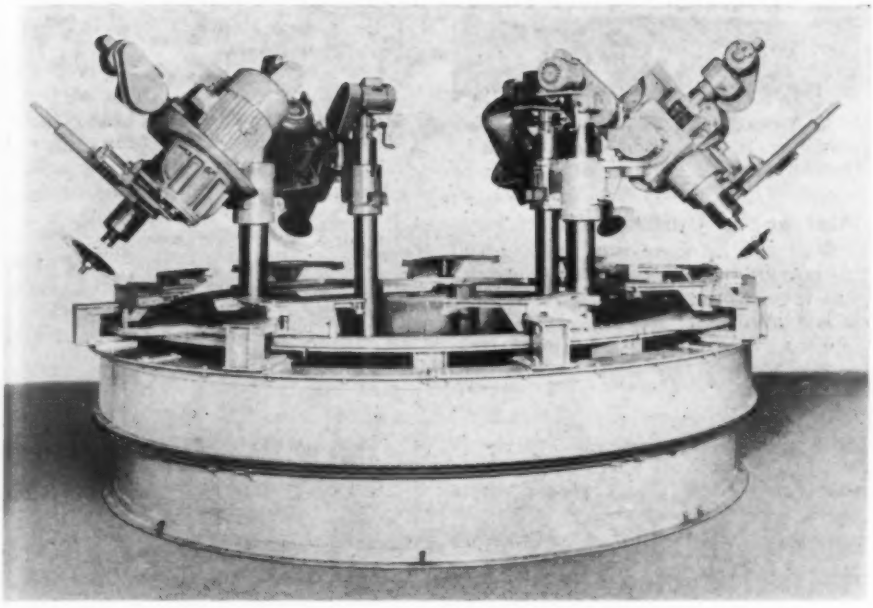
DEALERS IN PRINCIPAL CITIES
Call or Write for Demonstration

Distributed by

m-f equipment co.

410 Frelinghuysen Ave. Newark, N. J. Bigelow 2-6211

Use postpaid card. Circle No. 241



Rotary Conveyor Design Features New Automatic Buffing Design

A new Acme automatic polishing and buffing machine features a rotary conveyor design that cuts floor space for finishing high production parts.

Parts such as auto molding and stove trim, with sweep or angular shapes, are said to be ideally adapted to these rotary conveyor machines.

The number of work fixtures (up to a maximum of ten) varies with the part. Up to six adjustable lathes can be placed inside, and an equal number outside, the conveyor. The conveyor travels at speeds from 8 to 32 fpm.

Parts are loaded and unloaded from one position on the periphery of the machine.

Acme Manufacturing Company, 1400 East Nine Mile Road. Detroit 20, Mich.

Use postpaid card. Circle No. 59

"I'm disappointed in you . . . you promised you'd give them a try the last time I called!"

Why put off a good move? Call your Industrial Distributor or have one of our abrasive Engineers arrange a trial run of Jewel Brand Abrasive Belts *today*.

JEWEL

COATED ABRASIVES

Belts • Rolls • Sheets • Discs • Specialties

ABRASIVE PRODUCTS, INC.

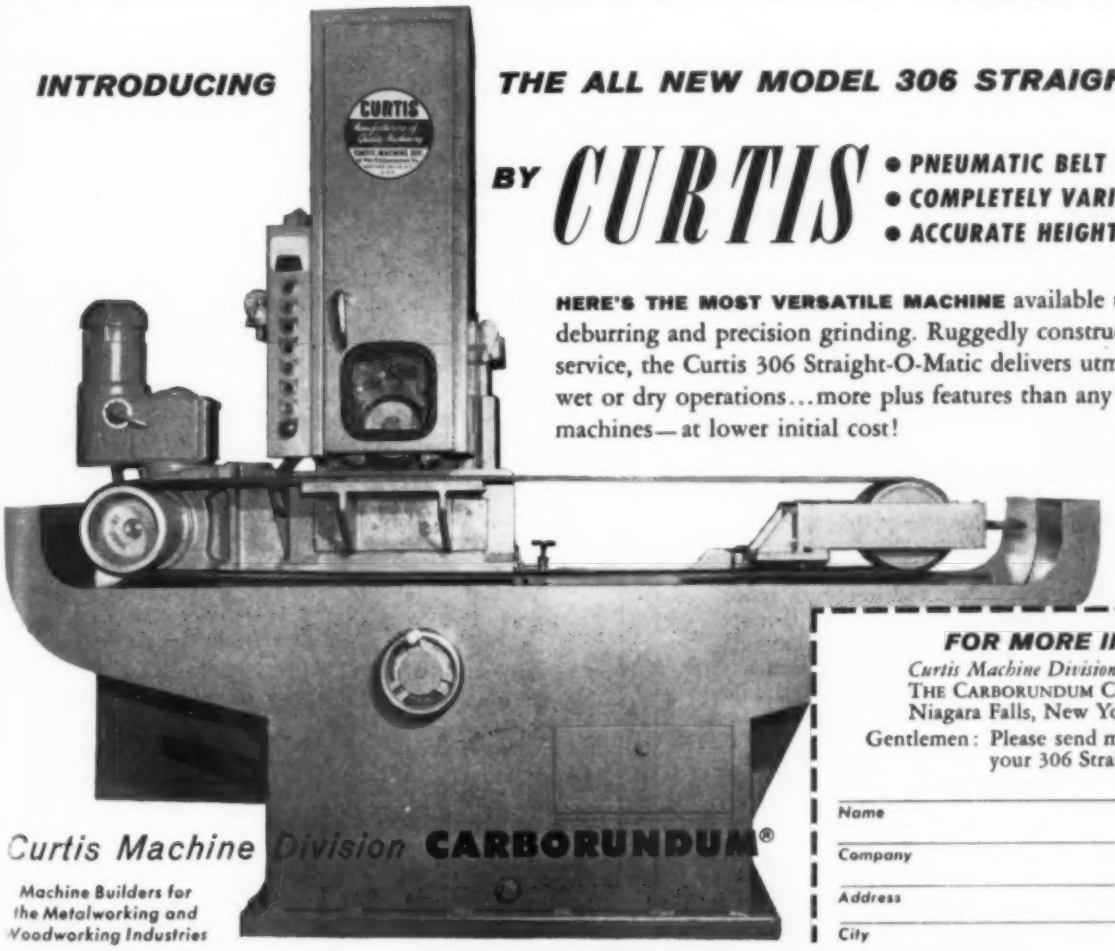
South Braintree 85, Massachusetts

Use postpaid card. Circle No. 243

INTRODUCING ***THE ALL NEW MODEL 306 STRAIGHT-O-MATIC***

BY CURTIS

- ***PNEUMATIC BELT TENSIONING***
- ***COMPLETELY VARIABLE BELT SPEED***
- ***ACCURATE HEIGHT ADJUSTMENT***



HERE'S THE MOST VERSATILE MACHINE available today for polishing, deburring and precision grinding. Ruggedly constructed for long service, the Curtis 306 Straight-O-Matic delivers utmost precision on wet or dry operations...more plus features than any competitive machines—at lower initial cost!

Curtis Machine Division CARBORUNDUM®

Machine Builders for the Metalworking and Woodworking Industries

FOR MORE INFORMATION

Curtis Machine Division
THE CARBORUNDUM COMPANY, Dept. GF
Niagara Falls, New York

Gentlemen: Please send me more details on your 306 Straight-O-Matic.

Name _____

Company _____

Address _____

City _____ *Zone* _____ *State* _____

H 93-GF

Use postpaid card. Circle No. 242

"That's right, son . . . I wouldn't change for all the tea in China!"

Loyalty is a common trait among Jewel Brand Abrasive Belt users. Once you've tried them, it's easy to see why. Job after job, year after year, they never let you down. Try 'em and see!

JEWEL BRAND

COATED ABRASIVES

Belts • Rolls • Sheets • Discs • Specialties

ABRASIVE PRODUCTS, INC.

South Braintree 85, Massachusetts

Use postpaid card. Circle No. 244

NEW EQUIPMENT *continued*

Mist Spray Unit

A new Bijur Spraymist unit is said to provide cool, clean grinding with full-time work visibility. The coolant is conveyed from a pressurized reservoir to the point of use through rigid or flexible jets. One unit can serve ten or more jets.

A solenoid valve connected to the machine circuit starts the unit when the machine is turned on. Atomizing takes place in the jet trip.

The illustrated unit has a capacity of 18 ounces. A one-gallon capacity unit, recommended for most production applications, is also available.

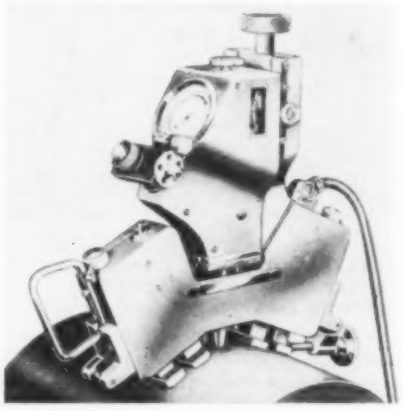
Bijur Lubricating Corp., Rochell Park, New Jersey.

Use postpaid card. Circle No. 60

Portable Hardness Tester for Flat or Curved Surfaces

Hardness testing of parts and in places that would normally be inaccessible is said to be easy with a new portable hardness tester.

Designed with the same body as the Penetrascope Mark VIII, and made by the same manufacturer, the new unit is available from Steel City Testing Machines, Inc.

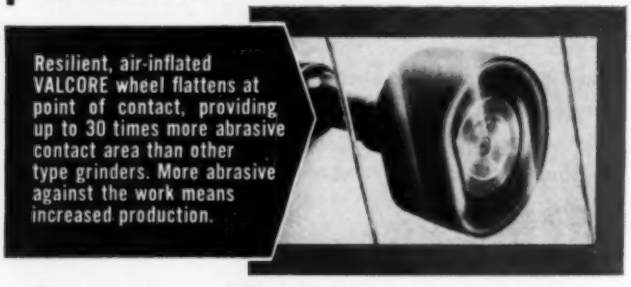


The new model is said to be especially useful for testing hardness of mill rolls. The indentor is a standard 136-deg pyramid-shaped diamond.

Steel City Testing Machines, Inc., 817 Lyndon Avenue, Detroit 38, Mich.

Use postpaid card. Circle No. 61

3000% more Grinding/Finishing/Polishing production!


Resilient, air-inflated VALCORE wheel flattens at point of contact, providing up to 30 times more abrasive contact area than other type grinders. More abrasive against the work means increased production.

You can boost grinding, finishing or polishing output up to 3000% on flat work, 600-700% on contours, by backing up your coated abrasives with VALCORE inflated wheels. Resilient contact drum puts more abrasive against the work . . . absolutely prevents band slippage . . . eliminates undercuts . . . avoids chatter and bounce . . . produces straight-pattern finish. Use VALCORE on portable tools or benchstands for all abrasive operations from moderate stock removal to fine micro-finishing.

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Reprints of the articles listed below are available in sufficient number for general distribution. In addition, limited quantities of reprints of many articles are in stock, and will be sent out on request as long as our supply lasts.

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Effects of Material on Snagging Wheel Performance
Flap-Type Coated Abrasive Wheels
How Good Are Man-Made Diamonds?
When and How You Can Use Crush Form Grinding
Central Coolant Systems . . . Cure or Curse?
How to Reduce Snagging Costs by Proper Wheel Testing
"In Place" Roll Grinding
Cleaning Grinding and Finishing Coolants
Residual Stresses Produced by UP Grinding and DOWN Grinding
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Automatic Small-Billet Grinding
Centerless Grinding 35c
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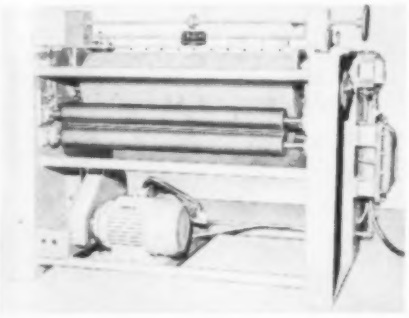
Why Honing? 1.00

GRINDING and FINISHING
Hitchcock Publishing Co.
Wheaton, Ill.

New Impregnated Nylon Wheel Polishing Machine

The Union Tool Corporation, Warsaw, Indiana, has introduced a new metal polishing machine employing the recently developed impregnated nylon polishing wheel.

Known as the "Uni-Finisher", this machine will apply a light abrasive action to metal, plastic or wood sheets from 6" to 50" wide, 0" to 4" thick, at speeds up to 60 lineal ft./min.



The Uni-Finisher is ideal for a variety of metal polishing operations. Excellent as an integral part of automatic conveyorized finishing system.

Polishing wheels are available up to 20" diameter, variable along with degree of oscillation to the job requirement. The Uni-Finisher is furnished with powered feed rolls and off-bearing rolls, or endless belt feed, depending upon application. A dust hood is supplied with each unit.

The Union Tool Corporation, Warsaw, Indiana.

Use postpaid card. Circle No. 62

Chip Breaker, Oscillating Cup Grinder for Job-Lot Grinding

A new low-cost electrically-aided chip breaker and oscillating cup wheel grinder (Model CME-66) has been developed by Hammond Machinery Builders for shops which do not require larger models. It is said to be ideal for low and medium volume grinding.

Available with either conventional, manual spark, or automatic spark controls, this new "2 in 1" machine provides oscillating cup wheel grinding on one end, and chip breaker grinding on the other.

According to the manufacturer, this grinder enables the operator to grind faster, to rough and finish in one operation, to eliminate heat fractures, and to save from 80% to 90% in diamond wheel consumption.

Hammond Machinery Builders, Inc., 1651 Douglas Avenue, Kalamazoo, Mich.

Use postpaid card. Circle No. 63

Low-Cost Ultrasonic Machine Tool

Sheffield's new model ultrasonic machine tool is designed for precise machining operations on hard and brittle materials, including dicing of germanium and silicon wafers and other semiconductor materials.

The machine provides small companies and research laboratories with a low-cost machine for job-lot production, which also has built-in capacity to handle high production as the need arises.

The standard machine is powered with a 1000 watt electronic generator, though a 200 watt generator can be supplied when only one machining station is needed.

The Sheffield Corporation, subsidiary of The Bendix Corporation, Dayton 1, Ohio.

Use postpaid card. Circle No. 64

Vertical Pneumatic Grinders

Series 923 vertical pneumatic grinders (Thomas C. Wilson, Inc.) are said to be particularly suited for metal removal in deep cavity molds and other hard-to-get at places. Weight is 2 pounds.

The threaded spindle model operates at 18,000 rpm, uses 3" depressed-center wheel with 3/8" arbor hole. The collet chuck grinder is available with speeds of 18,000, 20,000 or 22,000 rpm, with 1/4", 3/16", or 1/8" collets.

Thomas C. Wilson, Inc., Long Island City, New York.

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ATOMIC-ACCURACY *in* CLOVER ABRASIVES

There is good reason for the lasting quality and uniformity of Clover Coated Abrasives. Each step in their manufacture is controlled by Beta Ray gauges (nuclear devices) to make absolutely sure they meet Clover's high standards. Result is: Consistent heavy-duty performance on the job.

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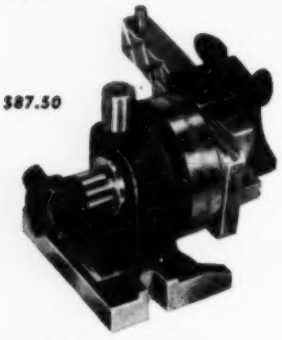
Angle Tangent to Radius WHEEL DRESSING *Simplified*

WITH ROTHFUSS TOOLS

THE G-5 RADIUS DRESSER is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on all wheels up to 10" and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation
Price $80.50

Price $87.50



THE G-2 ANGLE DRESSER AND TOOL HOLDER is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up jobs to be milled, drilled, tapped on any desired angle.

FREE STORAGE CASE of light-weight steel, with a hinged top, heavy duty latch and a blocked interior to insure the safety of the dressers when carried.

OUR FIXTURES will dress most radii and angles tangent each other, similar to those shown below.

All for only **$149.50** *(including case and both tools with diamonds)*

Distributorship available in select territories

ROTHFUSS TOOL COMPANY
BOX 2696 ELMWOOD STATION PROVIDENCE 7, R. I.

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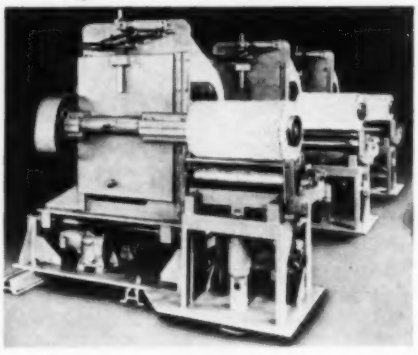
NEW EQUIPMENT *continued*

Wide-Face Wheel Head

A new wide-face wheel head, specially designed for continuous buffing of aluminum, brass, or steel coil stock, has recently been added to Murray-Way's line of specialized polishing and buffing machinery and complete automatic production lines.

These new heads are said to be unique, in that they may be placed in tandem and angularly positioned for cross-cutting action. The complete head oscillates, allowing more uniform buffing, and a special jog automatic wheel positioner is provided to compensate for buffing wheel wear.



A billy roll supports the strip at the buffing point. When stitched or welded coil ends pass under the buffing head, the billy roll automatically "drops out", allowing the strip to run free.

Buff sections are mounted on a separate, balanced, bearing-supported sleeve. The buffing heads shown are 24 inches wide, but provisions may be made for use of buffing heads of larger or smaller widths.

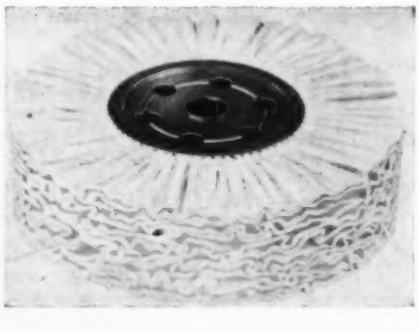
Murray-Way Corporation, P. O. Box 180, Birmingham, Michigan.

Use postpaid card. Circle No. 66

New Type Buff

A new "Amber Extra Life Buff" has been developed by Schaffner Mfg. Co., Inc. Treated, it is said to insure longer buffing life under the most severe conditions.

It was particularly developed for surfaces that need severe buffing and have a tendency to wear buffs down quickly. Finish is said to be smooth and scratch free. For both ferrous and non-ferrous metals.



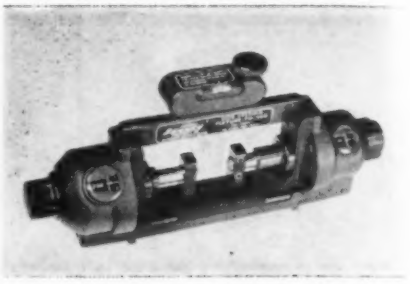
Schaffner Mfg. Co., Inc., Schaffner Center, Pittsburgh, Pa.

Use postpaid card. Circle No. 67

Hole Gaging Set Eliminates Need for Setting Masters

A new Sunnen hole gage set consisting of a comparator type gage and its size setting fixture is said to require no gage blocks, rings or other masters to set, check, or gage any hole size within its ⅜" through 1½" range.

The range can be increased to 3" by extension fingers. According to the manufacturer, settings approach the accuracy of gage block transfers, yet are simple, and entirely independent of the operator's "touch."



This portable, self-contained gage is intended for shop use; it has no racks or gears to wear.

Sunnen Service Corporation, 7912 Manchester Avenue, St. Louis 17, Mo.

Use postpaid card. Circle No. 68

Budget-Priced Sander, Polisher

Black & Decker has announced two budget-priced companion electric tools; the "Servicemaster" 7" disc sander and the "Servicemaster" polisher. Both are said to be new in design and construction details, as well as to have features usually found only in higher-priced tools.

Spiral bevel gears, die-cast aluminum housings, and enclosed, recess-mounted switch that cannot be turned on accidentally are some of the reported features. Each unit weighs only 8¼ pounds. Price each, $65.00.

The Black & Decker Mfg. Co., Towson, Maryland.

Use postpaid card. Circle No. 69

Compact Filter Removes 1-Micron Particles from Fluids

An easily-installed compact filter for oil, coolant, and hydraulic lines announced by Wire Cloth Products, Inc., filters up to 300 gallons of fluid per hour, will remove particles down to the size of one micron.

The new unit is the Model C-4510 Bell filter, 12" high, 9" in diameter, and weighing less than 10 pounds.

Wire Cloth Products, Inc., 2801 Congress Street Expressway, Bellwood, Ill.

Use postpaid card. Circle No. 70

News from the Industry

Carborundum Distributors Meet at Cleveland

Twenty-four distributors from the Cleveland trading area recently joined sales management personnel of The Carborundum Company's Bonded Abrasives and Electro Minerals Divisions at a three day conference, Wade Park Manor Hotel, Cleveland, Ohio.

Discussions covered the full range of grinding wheels and abrasive grains, catalogs, sales training, appraisals, inventories, with all presentations geared to increasing profitable distributor sales in 1960.

Distributor firms represented at the Cleveland conference were: Snyder-Bentley Company, Youngstown, Ohio; Minerva Industrial Supply Corp., Minerva, Ohio; Hardware & Supply Company, Akron, Ohio; Industrial Distributors, Inc., Cleveland, Ohio; Pittsburgh Gage & Supply Co., Sharon, Pennsylvania; Allied Abrasives & Tools, Inc., Cincinnati, Ohio; Geo. Worthington Company, Cleveland, Ohio; and Hydromatic Metal Finishing Inc., Cleveland, Ohio.

Bay State Abrasives Buys West Coast Diamond Wheel Firm

Bay State Abrasive Products Company, Westboro, Massachusetts, has purchased the Felker Manufacturing Company of Torrance, California, it has been announced by Arthur E. Gilman, president of the Massachusetts grinding wheel firm.

In announcing the details of the acquisition, Mr. Gilman said: "Purchase of the Felker Manufacturing Company gives Bay State Abrasive Products Company a West Coast facility which is in keeping with our expansion goals. Felker is a well-known manufacturer of diamond abrasive cutting wheels used in many industries including construction, marble and granite, building, ceramic, lapidary and electronic (crystal cutting). They also manufacture machines and accessories used in these industries . . . cut-off, lapping, lapping compounds and core drills."

The Felker Company will be operated as a wholly owned subsidiary of Bay State under the direction of Vice President, Elden L. Auker. Lester F. Kusmick will be retained as manufacturing manager and Fred K. Ryan as sales manager. Felker has 120 employees and 500 national distributors. No immediate changes are planned in the newly acquired subsidiary's operation.

New Natural Diamond Grit For Metal Bond Wheels

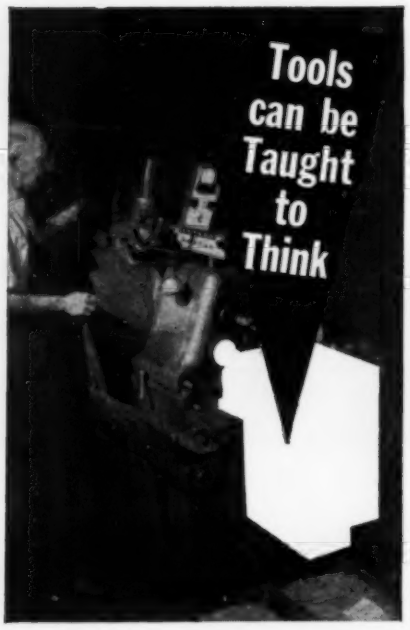
A new type of natural diamond grit, specially suited for use in metal-bonded cutting and grinding tools, has been developed at Diamond Research Laboratory in Johannesburg, South Africa.

The new diamond grit is made up of the strongest, most abrasion-resistant diamond particles for use in metal matrixes. A new selecting process removes weak and friable particles from the grit and thus the inherent strength of natural diamond becomes a distinct advantage in the heavy cutting done with metal-bond wheels and saws. The new grit has been found stronger than any diamond grit so far available.

Diamond Research Laboratory has tested the new grit in grinding wheels and saws. In cutting concrete, marble, tile and similar abrasive materials with the new grit, a 30 to 50 per cent faster cutting rate was achieved than has been previously possible. Tests of the new material are underway in production set-ups, and experimental quantities of the selected natural diamond for metal bond will be offered to wheel makers in the United States at an early date.

The stronger diamond grit will be of major importance to highway and airport paving contractors. Diamond wheels and saws are used on a large scale in cutting expansion joints in concrete pavement and smoothing the surface of jet aircraft runways. Diamond particles must be able to withstand heavy, variable pressures in cutting the various types of aggregates found in paving materials.

The new diamond grit will be offered in mesh sizes from Tyler screen 20 to 325. The larger mesh sizes are applicable in such diamond implements as metal-bond saws and thin-wall core drills which are used for cutting concrete, stone and other rugged materials. The smaller cube-like diamonds will be used to advantage in metal-bond wheels for cutting and grinding of more consistent materials such as glass and the ultra-hard ceramics.



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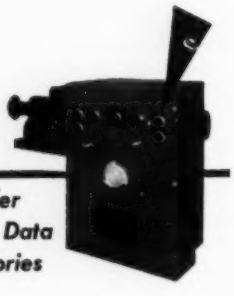
*at Our Expense**

The INCHWORM® motor, replacing the lead screw on centerless grinders, completely eliminates backlash and gives tolerances to ± .000025".

Standard *MICROtrol*[1] 160 gaging and control components can be added to the INCHWORM for fully automatic centerless grinder operation. These reliable, fully proven, closed loop systems have enabled many leading producers of precision parts to achieve previously impossible tolerances at lower production costs.



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AIRBORNE INSTRUMENTS LABORATORY
DEER PARK, LONG ISLAND, NEW YORK
A DIVISION OF CUTLER-HAMMER, INC.

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3M Company Offers Grinding 'Cost Check' Program

A wealth of grinding and finishing experience—backed up by the most advanced research facilities in the industry—is available to any company in the country for analyzing its grinding and finishing operations.

Minnesota Mining and Manufacturing Co., St. Paul, for more than 50 years a specialist in the development and application of coated abrasives, has announced a program whereby a company can apply 3M's background to solve its own particular grinding and finishing problems.

Called "Cost Check 5-4-5," the program is based on 3M's belief that coated abrasives can perform 98% of any firm's grinding and finishing needs —and do it faster, better and at lower cost than any other method. The numerals represent the basic elements from which coated abrasives are made: five minerals, four backings and five bonds.

Companies wishing to utilize the service need not be 3M customers, nor is the purchase of 3M products a requirement. Here's how it works:

A plant foreman or finishing engineer who believes his grinding and finishing costs should be lower, or the finish better, or the over-all operation more efficient, simply writes to the 3M company, requesting "Cost Check 5-4-5."

The 3M company points out that the program is entirely voluntary on the part of the participating firms; 3M will not "solicit Cost Check business because we feel it should be up to companies doing metal finishing to decide about their own operations."

After the request for "Cost Check 5-4-5," the requesting firm will receive a review portfolio which asks for information concerning present grinding and finishing operations. This includes information such as type of part, surface desired, purpose of abrasive operation, time involved, and the like. Again, the filing of information is at the convenience of the applicant.

When the portfolio is completed, the firm calls in a 3M field engineer who will go over the information with the requesting firm's finishing personnel.

The 3M company frankly expects to find that some grinding and finishing operations are already being conducted under optimum conditions, and are producing optimum results. If this is the case, no changes will be recommended.

If it is evident that changes can and should be made to reduce costs, provide better finish or increase production, proper recommendations will be made. It is then up to the requesting firm to make the changes.

Pratt & Whitney To Sell Through Selected Distributors

Pratt & Whitney Company, Incorporated, West Hartford, Connecticut, announces plans to make two product lines available to customers through selected industrial distributors.

Pratt & Whitney, which celebrates its 100th anniversary this year, has always sold all products on a direct basis through its own company representatives and branch offices. However, in the very near future, the company's wide line of cutting tools and conventional gages will be sold through local industrial distributors. As in the past, Pratt & Whitney's factory-trained representatives will be available to assist distributor salesmen and their customers.

Carbo, Pechiney Make Sales Pact

An agreement on the manufacture and sale of aluminum oxide has been concluded between two of the world's larger industrial organizations—Pechiney of Paris, France and The Carborundum Company, Niagara Falls, New York, U.S.A.

The agreement provides that Carborundum will acquire a share of the capital of Les Abrasifs du Sud-Ouest, a subsidiary of Pechiney engaged in the manufacture of fused aluminum oxide crudes and abrasive grains used in the manfacture of grinding, polishing and finishing media.

The agreement further provides that Carborundum International S.A., Geneva, Switzerland, a subsidiary of The Carborundum Company, is granted exclusive sales rights for the products of Les Abrasifs du Sud-Ouest outside territories under French influence.

"American" Announces New Warehouse

The American Emery Wheel Works of Providence, Rhode Island, have recently announced the removal of their Detroit district offices and warehouse to Warren, Michigan.

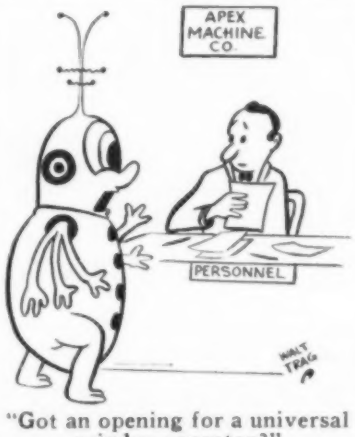
Under the supervision of Earl Haden, the new office spaces and increased warehousing facilities are in keeping with "American's" current expansion policy and will enable them to better serve their Michigan accounts.

Bay State Installs Titanium Grinding Wheels

The problem of grinding titanium slabs was recently answered for one firm by Bay State Abrasive's prescription grinding service. The job in question called for grinding titanium slabs size 111 inches by 66 inches by 2¼ inches on all sides.

Bay State's engineers used a mechanical swing frame machine with 24 x 3 x 12 wheels of an aluminum oxide and silicon oxide combination. The slab was heated to 350°F. before grinding and the wheels removed 150 lbs. in eight hours at a rate of 18¾ lbs. per hour.

At a similar installation in another plant, Bay State's wheels have a removal rate of 54.8 lbs. per contact hour with a 1.72 hour life per wheel.



"Got an opening for a universal grinder operator?"

R-O Exchange Plan On Grinders Offered

R-O equipped shops desiring to add the recently announced R-O Comparator can exchange their present grinder bases for new grinder bases on which the comparator can be mounted. The exchange plan not only enables owners to replace equipment on which lead screws and other parts have undergone normal wear, but gives him up-to-date equipment.

The R-O exchange plan is designed for the equipment owner's convenience. After ordering, the customer retains his present equipment for use until the new R-O comparator and new grinder arrive at his plant. When the equipment is received, he removes the motor column from his present grinder and installs it on the new. The old grinder base is then returned. Details of the exchange plan can be obtained from R-O Manufacturing Co., 31171 Stephenson Highway, Madison Heights, Michigan.

Barrel Finishing Sales

Formation of M-F Equipment Company to handle sales of barrel finishing equipment to dealers has been announced by Paul E. Kirchartz, President of Metal Finish, Inc., Newark, N.J.

The new organization will distribute "Vibraslide" vibrating rotating machines, "Metal Finish" barrel finishing machines, and a complete line of separating and materials handling equipment.

Ex-Cell-O Acquires Kodak's Contour Projector Business

Ex-Cell-O Corporation of Detroit has arranged to purchase the Eastman Kodak Company's contour projector business, it was revealed today in a joint announcement by H. Glenn Bixby, Ex-Cell-O president, and Albert K. Chapman, president of Kodak.

Bixby had previously announced that Ex-Cell-O had acquired the Rochester, New York firm, Optical Gaging Products, Inc., which is the sole marketing agent for the contour projector in the United States and Canada.

Kodak will retain a non-exclusive license, and through its Apparatus and Optical Division in Rochester will continue to produce some parts, including optical components, for the projector as a supplier to Ex-Cell-O.

Fiat Buys Dry Blast Unit

A semi-automatic dry blast unit designed to remove core sand and foreign material from the interior of cast iron motorcycle engine crankshafts was purchased recently by Fiat, S.A. of Turin, Italy. The unit was manufactured by

Anything new in Diamond Wheels?

YOU BET . . . THE NEW BC

RESINOID BOND FOR SURFACE GRINDING

Soft, "J and L," hardness wheels are recommended by many manufacturers for surface grinding.

Now a new, special "N" hardness bond has been successfully developed. Users report 30% *longer life, greater efficiency,* smoother finish, and elimination of chatter marks.

Man-made diamonds give optimum performance. Ask for and try the following grade:

MD 120 N100 BC

SEND US SATISFACTION GUARANTEED ORDERS. MAKE US PROVE THESE FACTS.

PRECISION DIAMOND TOOL CO.
P.S.M. ELGIN, ILLINOIS

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the **Pressure Blast Mfg. Co.**, Manchester, Connecticut.

In operation, the front work loading door is opened and the crankshaft manually placed in position on the work device. The door is closed and operator energizes cycle "start stop" switch. The right hand blast gun indexes directly against the right hand crankshaft opening and automatically blasts for a 30 second period.

At the end of blast gun No. 1's cycle, gun automatically retracts. Then, blast gun No. 2 indexes into position on left hand of crankshaft end. Gun No. 2 performs a 30 second blast cycle and retracts. Operator opens door, removes crankshaft and repeats cycle.

New Process Upgrades Natural Diamond Quality

Full scale production of Pressure-Tested diamond grits and micron sized powders has been announced by Diamond Tool Research Co., Wholesale Division, New York. Over half a million carats have already been sold to manufacturers of industrial diamond products, 60,000 carats in April.

This new diamond abrasive is unlike others in that the diamonds have been quality pre-tested in the method of production. Extreme pressures that are under precise control break the rough diamonds into sound, blocky grits. Slivers, flats and pieces with severe internal stresses are subjected to a pressure that breaks them again and again until only sturdy grains result. Those grits and powders that survive the pressure test are trade marked "Pressure-Tested."

Extensive tests have been made in lapping and grinding carbides, steel, corundum and diamonds. These diamond structures are said to be extremely blocky, longer lasting, smoother cutting; and their uniformity makes closer grading possible.

Elgin Adds Seven Distributors

The Abrasives Division of the Elgin National Watch Company has announced the appointment of seven new distributor organizations to handle sales of its diamond wheel products.

The distributors and their locations are:

R. Van Alstine Tool Company
205 Central Avenue
Schenectady, New York

Rose, Kimball and Baxter, Inc.
511 Baldwin Street
Elmira, New York

Maxwell-Padelford Co., Inc.
17 Brook Road
Needham Heights 94, Mass.

Helco
3427 Missouri
St. Louis, Missouri

R & D Tool and Supply
3140 Midway Drive
San Diego 10, Calif.

M. J. Kelly Supply Corp.
323 Water Street
Syracuse, New York

Elco Tool Co.
1515 Wells Street
Fort Wayne, Indiana

Roto-Finish Names Mexican Agent

Roto-Finish Company, Kalamazoo, Michigan, has entered into an agreement with G. Torres McDonald, manager of **Ethone de Mexico** to make that company exclusive Mexican licensee for Roto-Finish processes and materials.

Stow Flexible Tool Shafts Deliver Job-Rated Performance

Stow Flexible Tool Shafts are ideally suited for production grinding, polishing, sanding plus many other finishing operations. Stow shafts help to increase precision and to eliminate operator fatigue. Flexibility and ease with which the handpiece can be maneuvered permits a freedom of operation that can not be equalled with any other portable tool.

Equip your idle motors or gasoline engines with Stow Tool Shafts. Harness your available power in planning production short-cuts.

Only precision ball bearings are used in the motor connections and handpieces. High quality shaft cores and rubber, oil-resistant casings are used in all sizes.

A large number of single-speed and multi-speed complete flexible shaft machines are immediately available to you for your particular requirements. Capacities range from ¼ HP to 3 HP with speeds up to 6800 RPM. Find out how Stow Flexible Shafting can work for you.

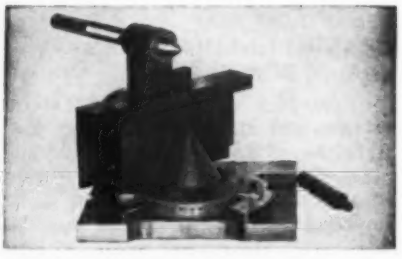
Send for Catalog 59.

STOW MANUFACTURING COMPANY
310 SHEAR STREET • BINGHAMTON, N.Y.

Use postpaid card. Circle No. 254

THE CRYSTAL LAKE DIAMOND-CONE WHEEL DRESSER FOR SUPERFINE FINISH:

1. One to Four Microinch Surface Finish.
2. Hydrodynamically Controlled Motion.
3. Coolant flushed wheel surface during dressing.
4. Double Cone Construction.
5. Direct Radius Control to .0001".
6. Oil Sealed bearings.
7. Universal use — Cylindrical, Internal & surface.



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New Steptool Representatives

New representatives, and their territories, for the Steptool Corporation, Los Angeles, are the following:

R. J. R. Kelley Co., 519 Main Street, East Orange, N.J., for the New England and Middle Atlantic states.

Hazerodt Associates, 903 South Woodward Avenue, Royal Oak, Michigan, for Michigan, Ohio, West Virginia, Kentucky, and Indiana.

C. M. Huss Company, 2822 West Peterson, Chicago 45, Ill., for northern Illinois, Iowa, and Wisconsin.

Gisholt Appoints Distributors

Gisholt Machine Company, Madison, Wisconsin, has appointed **Southwest Machine Tool Corporation,** 222 North 7th Avenue, Phoenix, Arizona, to handle distribution of the Gisholt line in Arizona.

In the state of Washington and adjacent areas of Idaho and Montana, **Star Machinery Company,** with offices in Seattle and Spokane, Washington, and in Portland, Oregon, will handle distribution of the Gisholt line.

Scherr-Tumico Opens Chicago Sales Office

The new Scherr-Tumico office at 5045 West Harrison Street, Chicago 44, Illinois, like other company sales offices, offers showroom and warehouse facilities in addition to handling sales. Like them, also, it is connected by teletype with the company's offices and manufacturing facilities in New York, N.Y. and St. James, Minnesota.

Dale W. Freyberg, veteran sales supervisor for Tubular Micrometer Co. in the area, is in charge of the new office.

Starrett Moves New York Office to Springfield, New Jersey

The L. S. Starrett Company announces the relocation of its New York branch with the opening of an integrated sales office and warehouse building at 48 Commerce St., Springfield, New Jersey.

The building is similar to the one recently opened at 4949 West Harrison Street, Chicago.

"Come, come Hines. Even the best of us knock the radius off a wheel the first time we use it."

Changing Faces . . .

Willard H. Spence was recently elected vice president and general manager—Industrial Products Division, Brown & Sharpe Manufacturing Company. He will also continue, for the present, his responsibilities as managing director, Brown & Sharpe, Ltd., Plymouth, England.

Dr. Claus R. Goetzel, senior research scientist and adjunct professor, Department of Metallurgical Engineering, New York University, has been retained as consultant by Micro Metals Corporation, Paterson, New Jersey.

The Cushman Chuck Company, Hartford, Conn., has announced the addition of **Dale F. Holmes** to their West Coast sales staff. He is assigned to southern California and Arizona.

John F. Nieman has been named service products district manager for Johnson's Wax in southeastern U.S.

Herbert L. Martin has joined the Arcair Co., Lancaster, Ohio, as field representative in the central U.S.

John D. Johnson, associated with Frederic B. Stevens, Inc., for ten years, has been promoted to district manager in charge of sales to the metal finishing industry in the state of Michigan.

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NEWS OF INDUSTRY *continued*

New president of The Timken Roller Bearing Company, Canton, Ohio, is **W. R. Timken,** succeeding **D. A. Bessmer,** retired because of ill health. New members of the board of directors are **George L. Deal,** secretary-treasurer; **Paul J. Reeves,** vice president, sales, and **Henry Tobey,** vice president, manufacturing, Bearing and Rock Bit Divisions.

Louis Polk, Jr., has been appointed a full vice president of The Sheffield Corporation, a subsidiary of The Bendix Corporation. His new title is vice president of operations.

W. R. Timken

George L. Deal

Henry Tobey

Paul J. Reeves

Elanco Products Company, recently formed division of Eli Lilly and Company, Indianapolis, Indiana, has announced the appointment of **Frederick D. Randall** as vice president of industrial and home products marketing.

Frank D. Clark, vice president of The Van Keuren Co., has been appointed director of the newly created Thread Gage and Instrument Division. **William Mark,** sales manager, has been elected to the board of directors. **Donald Armstrong** is now assistant and sales manager—field.

Commercial Filters Corporation, Melrose, Mass., has elected **Frank W. Welling** executive vice president and treasurer, and **Gilbert H. TeWinkle,** assistant treasurer.

Jack A. Stevens has been appointed eastern division sales manager and **James A. Harrison,** New York and New England representative for Roto-Finish Company, Kalamazoo, Michigan.

F. D. Randall

Frank D. Clark

William Mark

D. Armstrong

J. A. Stevens

J. A. Harrison

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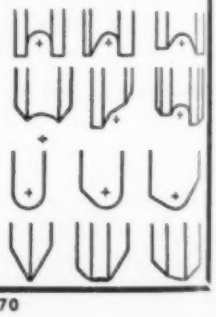

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At Van Norman Industries, Inc., **William J. Mericka** has been elected chairman of the board, succeeding **Donald P. Hess,** recently retired.

W. J. Mericka

The appointment of **Russell K. Annis** as manager of engineering at The New York Air Brake Company's Aurora Pump Division, Aurora, Ill., is announced.

The Mid-West Abrasive Company has appointed **Aubrey G. Rickards** as field engineer for honing stone sales and service.

Hartwell G. Howe has been appointed vice president and general manager of the Heald Machine Company, Worcester, Mass., a subsidiary of The Cincinnati Milling Machine Company, succeeding **Carl M. Beach,** who returns to the parent company. **Glenn C. Moore,** export sales manager, follows Howe; and **Charles H. Munsey,** former head of Heald, Ltd., Birmingham, England, succeeds Moore.

R. K. Annis

H. G. Howe

Glenn C. Moore

C. H. Munsey

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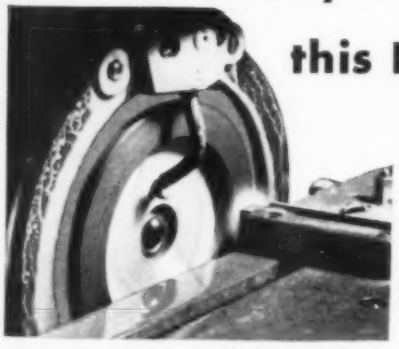

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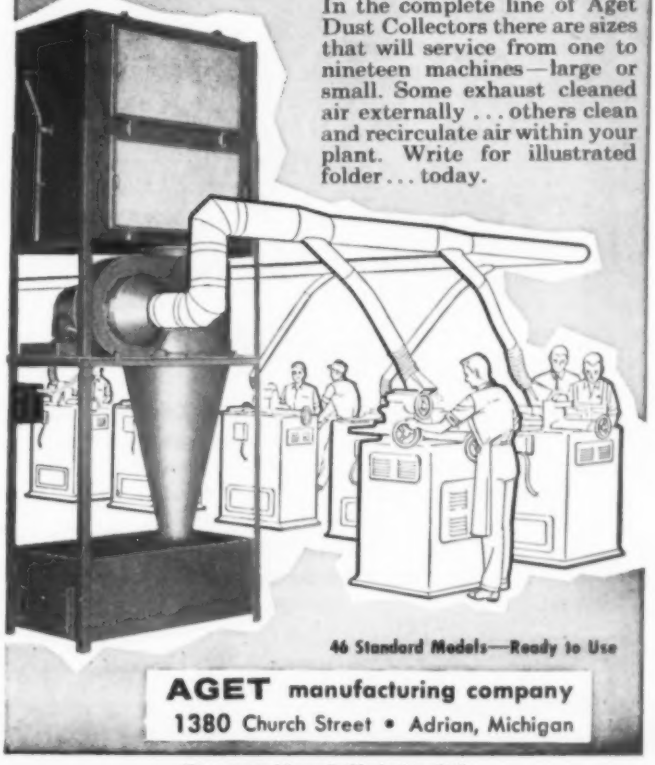

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NEWS OF INDUSTRY *continued*

The promotion of **Andrew J. Waitkins** to chief engineer at Fabri-Tech, a subsidiary of F. Jos. Lamb Co., Detroit, Michigan, has been announced.

A. J. Waitkins

George J. Jablonski, assistant works manager of Allis-Chalmers' Terre Haute Works since 1952, has been promoted to superintendent of all nuclear products West Allis Works, Wisconsin.

Douglas Tool Co., Detroit, Michigan, affiliated with Pioneer Engineering and Mfg. Co., Inc., has moved up **John P. Vederko** to vice president.

Nathan H. Koslow, now president of Penn-Scientific Products Co., Abington, Pa., will continue to serve as president of Associated Sales Company, Richmond, Virginia.

N. H. Koslow

New Detroit Division manager for Van Norman Machine Co. (automotive division) is **Thomas J. Garrison.**

Norton International, Inc., has announced the appointment of **Jack T. Wilber** as assistant to the director of manufacturing for Norton products.

Henry R. Odell was recently elected executive vice president of the Beloit Tool Corporation.

Jack T. Wilber

Henry R. Odell

T. J. Garrison

Robert T. Pring has been appointed to the newly created post of manager, dust collector sales, at Dracco Division, Fuller Company, Cleveland, Ohio.

Robert J. Noonan has returned to the American Tube Bending Co., New Haven, Conn., as production supervisor of the Electronics Division.

R. J. Noonan

The Abrasives Division, Elgin National Watch Company, has selected **Kevin Knowles** as West Coast field engineer for Elgiloy. **Harold Holsten** will continue to handle the company's industrial diamond products.

Norton Company, Worcester, Mass., has transferred **George P. Higgins** to field engineer, Teterboro, N.J., district.

In the Industrial-Automotive Division, The Black & Decker Mfg. Co., **John R. Anderson** has been transferred from district manager, Seattle, to a similar position in San Francisco, and **Harold E. Bankhead** succeeds him in Seattle. **Robert L. Tietjen** replaces **Thomas A. McCarthy, Jr.**, as sales representative in New York.

G. P. Higgins

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GRINDING and FINISHING

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Device turns slab so that any side or edge can be snagged.

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Production lapping to obtain dimensional accuracy, parallelism and finish presents problems.

33 Secrets of Carbide Die Finishing
Lapping and finishing of carbide dies with diamonds reduces surface friction.

36 Eighty Percent Less Time by Form Grind of Large Rolls
Crush form grinding greatly reduces time to redress and increases life of annular grooved rolls.

40 Automatic Sizing and Finishing of Rubber Rolls
IBM Typewriter rolls present unique problems in obtaining size and finish.

43 Wheel Grading by Frequency
Natural frequency of vibration is a sensitive measure of even minor wheel differences.

Coming Next Month

Crankshaft Finishing with Coated Abrasives
Finish polishing of journals and pins of crankshafts is an extremely important operation for quality production. Elements affecting friction in bearing performance must be carefully considered.

Russian Super Finishing
A process which uses water as the "cooling-lubricating fluid" for super finishing of copper cylinders instead of oiled slate has recently been reported from Russia.

How Carbide Inserts Are Ground
A report on the grinding of carbide inserts from a major manufacturer reveals close controls and newly developed grinding equipment.

New Theories in Lapping
As is true with any processing method constant study and reappraisal will reveal new approaches and developments.

you can BUFF, too on this *Oscillating* Belt Machine

Controlled Work Pressure
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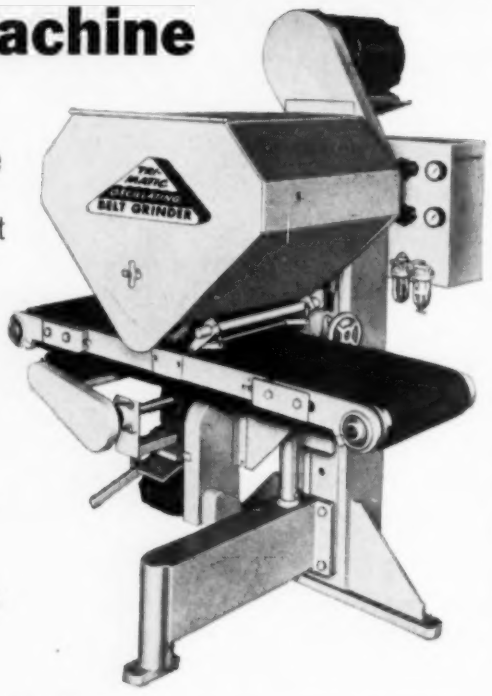
CHANGE BELTS in SECONDS



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A Final Thought

Can We Point with Pride?

Our nation has been dubbed by some as the nation of mediocrity. How mediocre our architecture? What of our sciences—chemistry, physics, astronomy, mathematics? Of navigation, celestial and otherwise? What of the mechanical world? What of our medicine? What of religion, where the voices ring out loud and clear?

Has any nation reached higher, looked further, and come closer to the stars than ours? In 20 years we've made the moon a neighbor and space an illimitable highway. Is this the work of second-rate engineers, scientists, designers and builders? The effort of mediocre incompetents?

These are the material—but what of the spiritual? Never before in the history of mankind has a nation given away so much of its wealth to others. To our families, our friends and neighbors we are a nation of sharers, not misers. Our values in home, family, justice, liberty and freedom run deep.

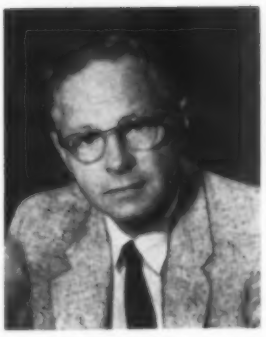
These spiritual values are no more mediocre than our material accomplishments. And there is this to be said for material things: you can have no deep, abiding spiritual values on an empty stomach, cowering cold in the corner of a hut, with the rack and scaffold within sight, and with pain, poverty and grueling labor constant companions. One might ask: in what age, in which nation, have existed any deeper spiritual values so that we might compare?

These are reassuring answers to the charge of mediocrity and many of us will sleep more soundly. But, honestly, just between you and me, and not for publication, is the mediocrity charge really ill-founded? With all of our facilities and opportunities are we doing the best we can?

No nation has spent more for an educational system which is devoted to training conformists. Educational programs are based on developing averages, and do you know what an average is?—The best of the worst or the worst of the best. We are preparing students, not for a superior life, but for a life of status quo.

Professionally we are not as competent as we could be. We try to pass, and live by a code of "good enough." We do not study and continue to improve; we do not fight for better performance and for higher standards. With so many opportunities we still merely shuffle through the day so that we may shuffle home and squat like turnips before a lighted piece of glass watching other turnips groan and shake.

Morally, we should be superior beings. The wisdom of the ages is at our finger tips. The belly is full, the shelter is warm, the material wants are satisfied and our moral code should be above reproach. Instead, we live in the age of the fast buck, the goof-off, the crook and the racketeer, and the devil take the hindmost. While this sort of thing has always been with us, and our moral standards are probably no lower than they were 100 years ago, the point remains: With what we have, they should be at a much higher level.



After all is said, some of our accomplishments are of mighty stature and we should take pride in them, but lest we become complacent each of us has it within him—or available to him—to be twice the person he now is. And if there is one deadly sin above all the others, it is this: that a man not do the very best with what he has, that he deny his destiny and aspire to no greater heights than mediocrity.

Wm. F. Schleicher

Vice President & Editorial Director

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Booth 751, The Machine Tool Exposition

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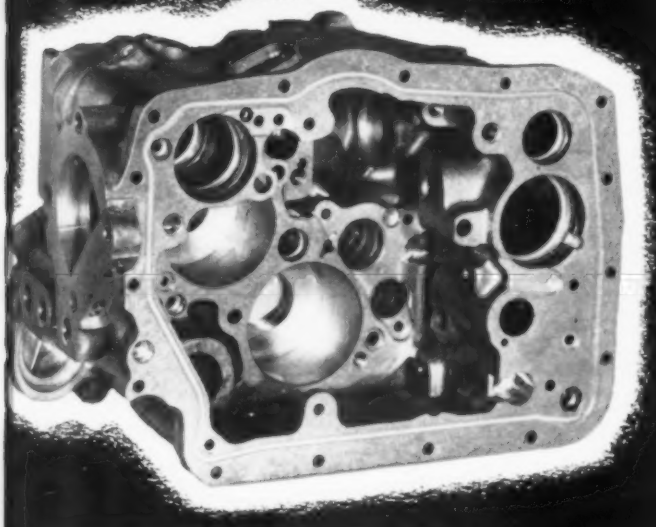

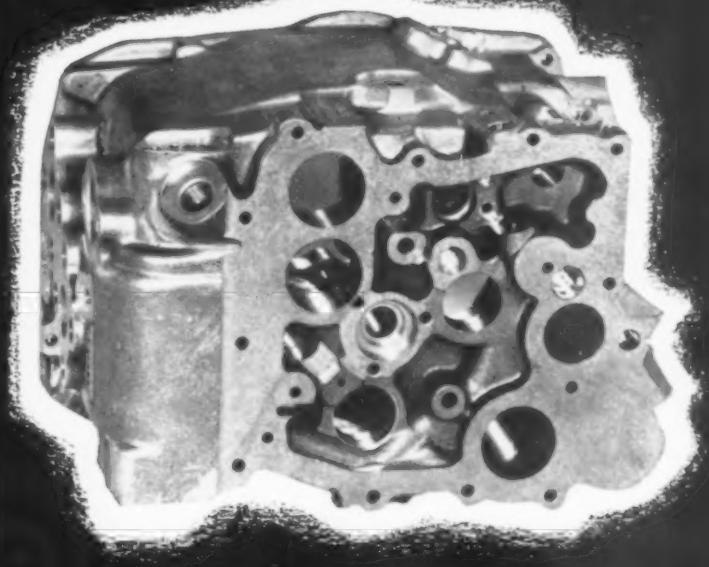

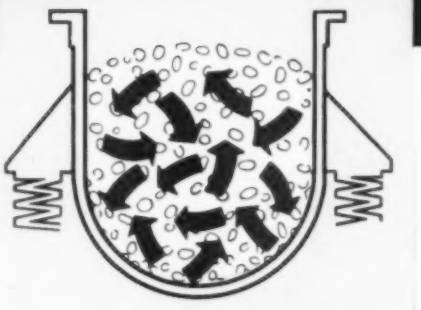

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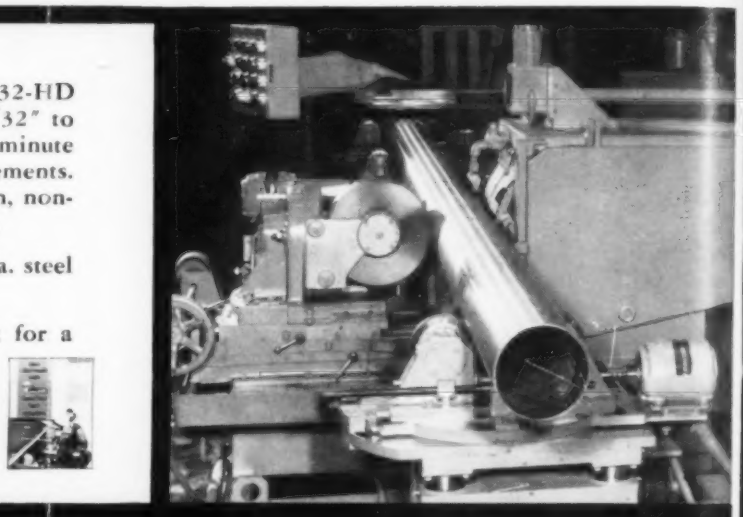
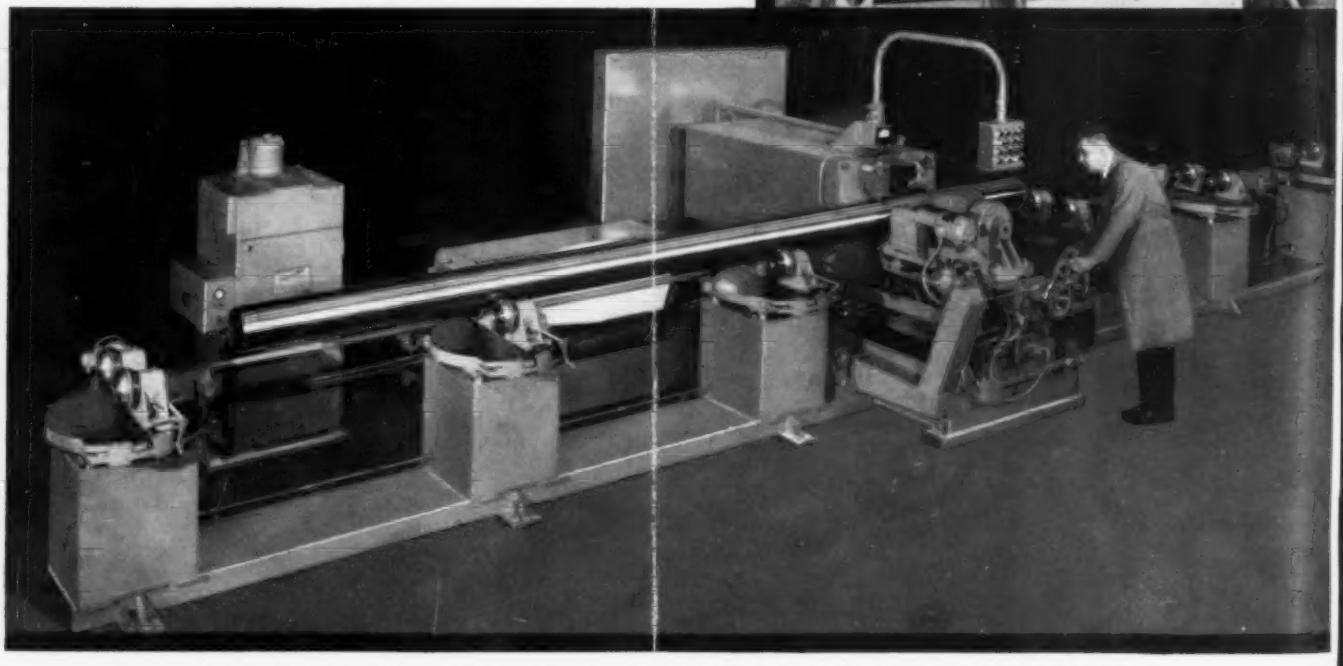
BELT GRINDING: combines rapid stock removal with improved quality on roughing and finishing operations

Take the new Sundstrand-Engelberg Model 8132-HD centerless belt grinder; it can handle stock from 3/32″ to 8-1/2″ dia. at through-feed rates from 1′ to 40′ per minute — and produce to high finish and tolerance requirements. Also, because stock through-feeds in either direction, non-productive time on multiple-pass work is eliminated.

One user is removing .020″ stock per pass on 8″ dia. steel tubes at a through-feed rate of 7′ per minute.

For more information, send for literature and ask for a Sundstrand "Engineered Production" analysis of your final finishing operations to determine the economic benefits of abrasive belt grinding on your jobs.





CHECK THESE FEATURES OF ABRASIVE BELT GRINDING:

GREATER PRODUCTION. Because of higher speeds, more grinding area, simpler set-ups, and no time loss for truing or wheel dressing, production is higher. Belts are sharper due to grain orientation. Flexing works out chips for better cutting edge exposure. Change-over time is reduced to a few minutes. Roughing and polishing can be done with only one setup.

• • •

MORE VERSATILITY. Any material can be machined: metallic or nonmetallic. They're efficient for either mass production, small lots, or toolmaking. They're more easily automated than many other machines.

• • •

LOWER COST. Remarkable production lowers costs per piece. You don't need skilled labor for their operation nor elaborate, expensive fixtures. Belt grinders cost less initially than most other finishing machines. Also, belts are less expensive than wheels and are much easier to store and handle.

• • •

SIMPLE AND SAFE. Abrasive belt machining is safer because wheel hazards are eliminated. Operator fatigue is reduced and chips present no problems. Belts are easily changed by inexperienced personnel.

SUNDSTRAND ENGELBERG

SUNDSTRAND-AMERICAN BROACH

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